Vol. XXVII. Part 4.

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The Journal of the Department of Agriculture of Victoria, Australia.

April, 1929.

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Value of Herd Testing—Seven Years' Work at Yinnar

Stocks for Fruit Trees

Crop and Fallow Competitions

Apricot Scab or Shot Hole—A Synopsis of Three Years' Experiments

Diseases of Stock

Poultry Tick

Composition of Mineral Licks

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THE DEPARTMENT OF AGRICULTURE,

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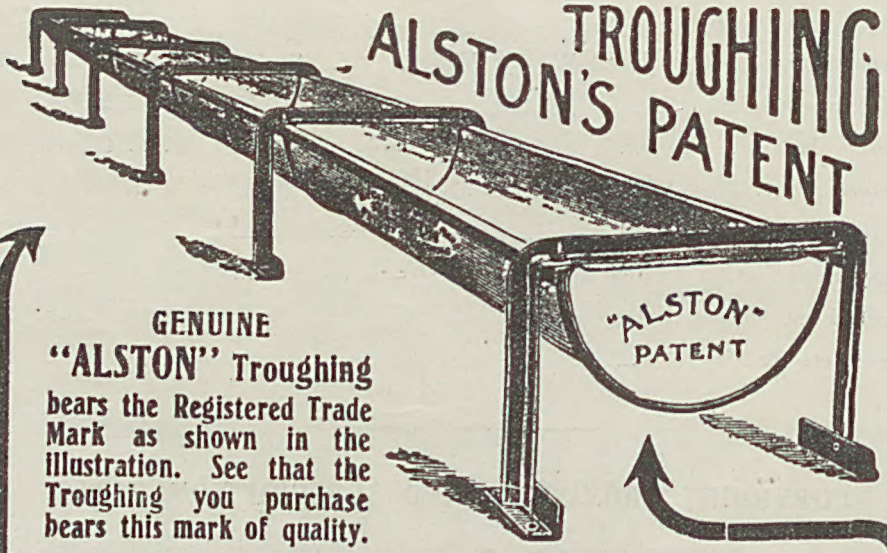

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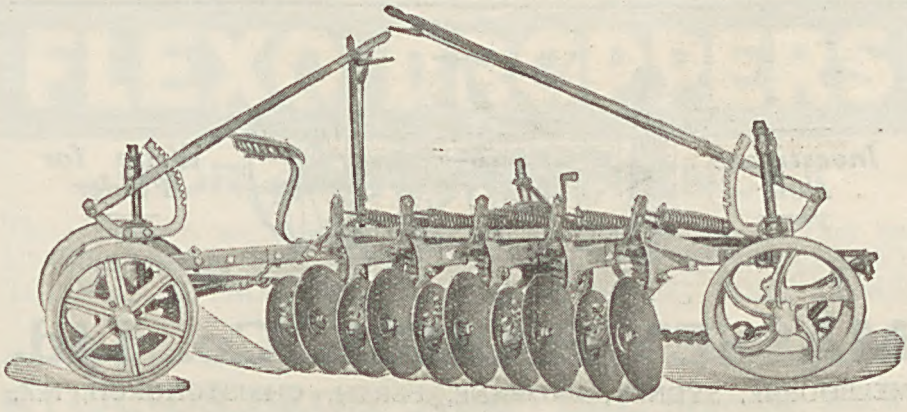

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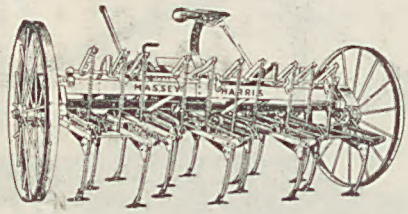

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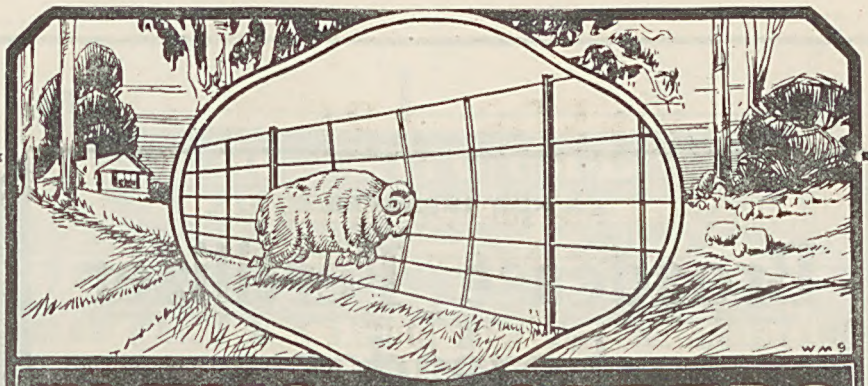

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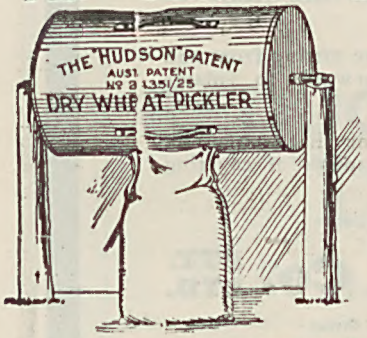

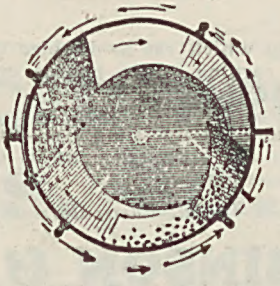

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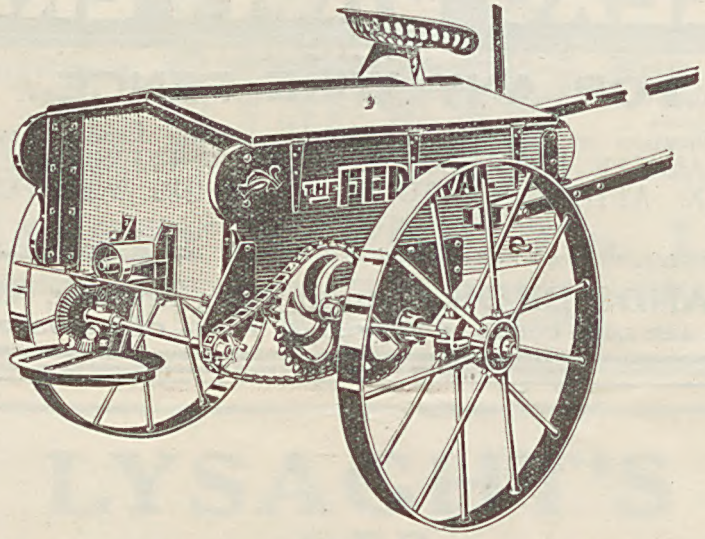

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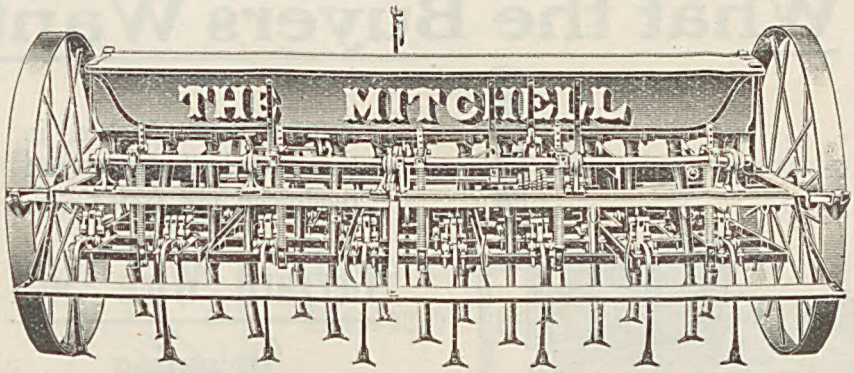

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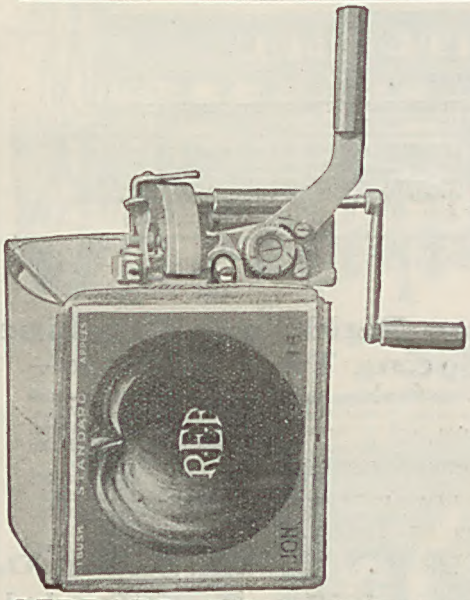

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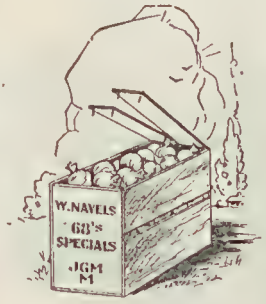

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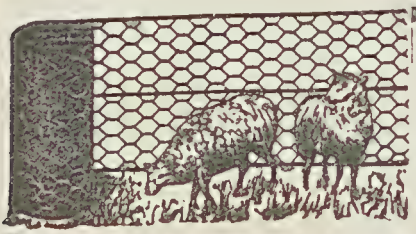

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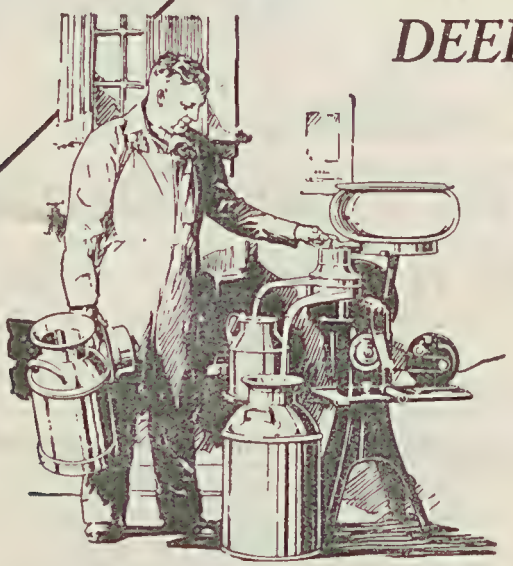

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THE JOURNAL

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Vol. XXVII. **April, 1929.** **Part 4**

VALUE OF HERD TESTING.

SEVEN YEARS' WORK AT YINNAR.

By W. J. Yuill, Senior Dairy Supervisor.

During the past decade great changes have taken place in dairy-farm practices at Yinnar. In the process, many old ideas have been dropped; the "scrub" bull has almost disappeared; herds solely grass-fed and untested have become rare, and interest is now displayed where formerly apathy existed. There is now a rational system of work employed which embraces pasture top-dressing, fodder conservation, herd testing, and the use of production-bred pure bulls.

The Yinnar Association is one of the pioneers of the group system of herd-testing work. It was organized in 1921, and commenced operations early in the dairy season of that year. Its history affords a striking example of what can be achieved by the application of control methods to dairy-farm work.

Where herd testing is practised, it is possible to control effectively the feeding, breeding, culling, and building up of the herd.

Production records of any cow for several lactations will definitely define her producing ability; further, continuous testing will sometimes reveal the outstanding dairy quality of one or more families, or lines of breeding, often traceable to a cow of exceptional dairy merit—in other words, to a cow highly developed in the production character.

Mr. F. Collins' cow "Bauldie" is an illustration of this point. Her record for five years is shown below, together with that of her three daughters, all of which are by high class sires.

Table I.—Records of "Bauldie" (Average for Five Years) and Three of Her Daughters (Average, in Two Cases, for Two Years and in One Case for One Year)—Members of the Herd of Mr. T. Collins, Yinnar.

Name.	Years of Age.	Milk.	Average Test.	Lb. of Butter-fat.
		lb.		
Bauldie (average 5 years) ..	9	7,284	5·32	= 368
Jewel, *ex* Bauldie	2	7,268	4·76	= 340
	3	8,500	4·56	= 388
Queenie, *ex* Bauldie	3	6,499	5·03	= 328
	4	7,807	4·97	= 385
Flora, *ex* Bauldie	2	7,232	4·74	= 343

Herd testing has led to fewer calves being selected, and generally to better care and development of those being retained.

Where herd testing is practised, it is possible to compare feeding systems to arrive at the cost of production, and to apply this information to each cow in the herd.

It is sometimes claimed that the increased production shown in District Herd Testing Associations is entirely due to better feeding, and in the main to seasonal influences. It is certainly true to some extent, more so of some areas of the State than of others. This influence is considered by a prominent authority in New South Wales to be as high as 50 per cent.

A glance at the following table will show that in a dairying district a steady and permanent increase in the per cow production can be obtained:—

Table II.—Average Results obtained by the Yinnar Herd Test Association, No. 1 Unit, for the Years 1921 to 1928.

Season.	Number of Cows under Test in Association.	Average lb. Butter-fat per Cow in Association.	Butter-fat Average of the Association "High" Herd.
		lb.	lb.
1921–22	676	195·7	256·77
1922–23	758	190·0	351·06
1923–24	678	236·0	365·35
1924–25	580	253·8	406·07
1925–26	567	263·2	396·36
1026–27	594	289·0	380·17
1927–28	568	319·0	411·77

The average increase per association cow is shown to be 124 lb. of butter-fat, and the increased production in the "high herd" to be 155 lb. of butter-fat per cow, during the period shown. At 1s. 6d. per lb. this increased production represents £9 5s. per cow for each cow in the association. Put in another way, in 1921-2, 676 cows earned £9,922; while during last year 568 cows earned £13,575, in both cases reckoning butter-fat at 1s. 6d. per lb. In yet another

Four of the Present Herd of Mr. T. Collins.

The sire at present in use is from "Creamy III. of Leisterfield" who tipped the 500 lb. mark on three occasions in the Government Standard Test. A Son of "Lady Grey I. of St. Albans" was previously used. "Spot," a grade cow, has this year finished her test with 534 lb. butter-fat; this cow was exhibited in the Better Farming Train during her lactation.

way, the comparison is shown to be £14 14s. per cow in 1921-2, and £23 18s. per cow in 1927-28. To these figures must be added the increased returns from a larger quantity of skim milk.

If we assume that the milk yield in 1921-2 was 400 gallons, and 600 gallons in 1927-28, it will be seen that 33 per cent. more milk is available for pig feeding—a very valuable item to a capable pig feeder.

In one herd last year £39 was the splendid return from cream and pig cheques. In this case less than £3 per cow was spent on manure, seed, and concentrate feed.

Herd Testing Directs Attention to the "Per Cow" Feed Requirements.

It has to be admitted that many dairy-farmers still cling fondly to the age-old system of determining the farm-carrying capacity from

"Primrose III.", a grade Jersey, owned by Mr. T. Quigley.

Her sire's dam was the leading heifer in the Standard Herd Test in 1920. "Primrose III." has this season averaged 1.83 lb. butter-fat per day for 138 days. Her record for the 138 days is 4,597 lb. milk yielding 304 lb. butter-fat.

what it *ought to carry,* or *used to carry,* rather than from what it *will carry,* or *can be made to carry effectively.*

Yinnar dairy-farmers are casting off these shackles; they are studying the feed requirements per cow, or the number of cows that the farm can be made to feed properly, rather than the number that can be maintained or kept alive.

I know of a farm in a part of the State where 60 cows were milked, and another farm where 21 were milked, and there was less than £10

difference in the year's total factory returns from each of the two herds. This illustration explains the difference between fully fed and partially fed herds. On the property first mentioned 39 more cows were milked and maintained for a return of less than £10. At Yinnar during last year, although the total number of cows milked was 108 LESS than the number milked in 1921; the financial return was 37.8 per cent. MORE. This result is to be ascribed to seven years of better farming methods.

If, in 1921, a return of £14 14s. per cow was sufficient to meet all farm costs, and provide a living, it is safe to assume that most of the increased return above that amount is profit, or a better return for labour.

When introducing new ideas, expenditure is unavoidable. Planting new pastures, top-dresing, herd testing, the purchase of a pure-bred bull, or the erection of a silo, cannot be undertaken without some cost. It is, however, generally true to say that it is not the cost that counts, but rather the return, or the earning power of the expenditure.

The feeding of concentrates, such as bran, crushed oats, meals, and cakes of various kinds can be relied upon to increase the milk production of the herd, and their rational use is increasing among Yinnar dairymen. But by far the greatest activity is being directed towards the development of better pastures and of legume crops, for it is now generally accepted that the cheapest production on a dairy-farm is from the farm-grown crops, particularly good pasture, legumes, and succulent crops in the young leafy stage.

Most of these farms now have some reconstructed pasture, the mixture being mainly cocksfoot, perennial rye, white clover, (*T. repens*), *alsyke* (*T. hybridum*), red clover (*T. pratense*), subterranean (*T. subterranean*). The mixture is varied to suit the variation in soils, rye being more predominant on heavy land and cocksfoot on the hills.

Fodder Conservation.

The erection of silos is now receiving attention, for the need and value of one is generally recognized. Delay in this direction has been due mainly to the exorbitant initial cost of both material and labour.

Mr. T. Collins has a concrete silo which he fills twice annually; the crops he grows for the purpose are oats in the spring, and maize in the autumn.

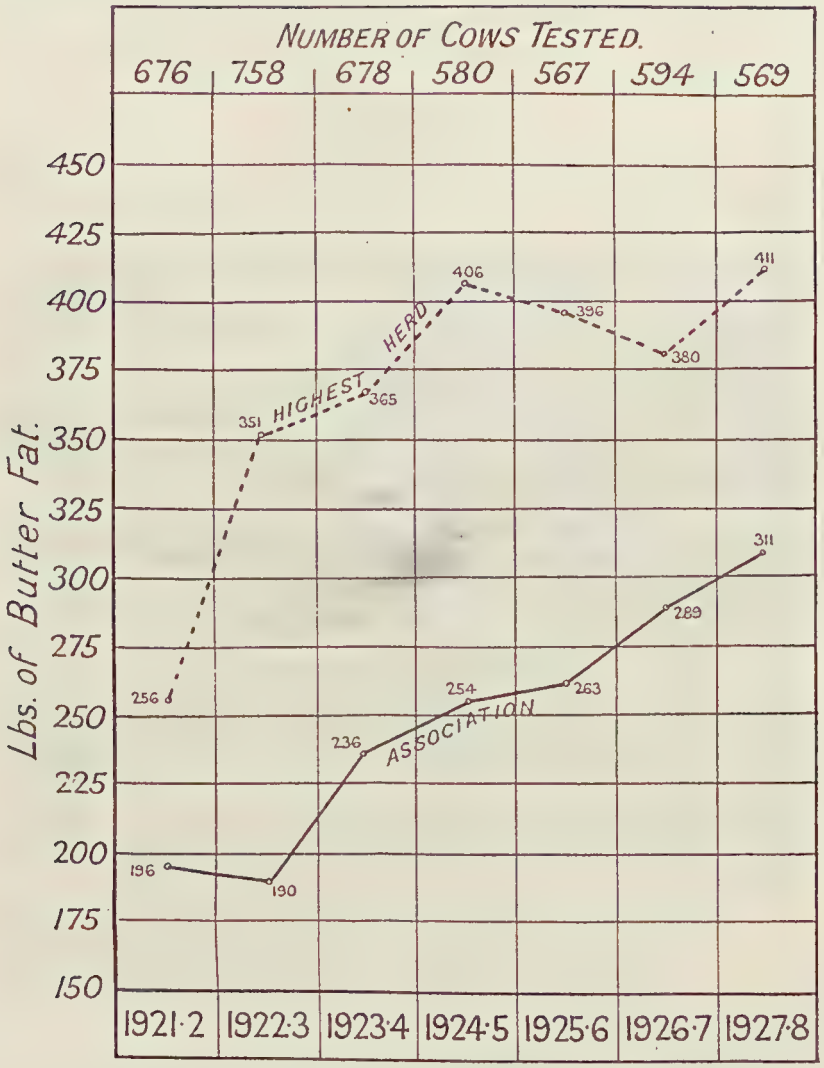
Mr. Dietrich is at present erecting a concrete silo in his spare time. Other farmers intend to erect at least one silo to tide their herds over the periods when the rotation system of grazing green crops breaks down; this at times is almost inevitable. Yinnar dairymen are beginning to realize that a full silo is a guarantee against a short dairying season.

On some of the farms red clover is displacing oaten hay, because of the clover's greater value for milk production, and because of the grazing it gives in the summer and autumn months. This is generally claimed to offset the valuable grazing from green oats during winter and spring. Another item in favour of red clover is that, although a biennial plant, one seeding will give at least three years of pasture —generally more than three years—while the oat crop must be sown annually.

Japanese millet is greatly favoured for summer feeding, while maize is more generally relied upon for autumn and early winter feed.

Better Bulls.

There are three units of the Association at Yinnar. The first unit has nearly 100 per cent. of its pure bull requirements; the full



Graph showing number of cows tested in the Yinnar Association for the years 1921-28.

The dotted line indicates the records of the highest herd (in this herd allowance was made for heifers). The solid line indicates the Association's progress.

complement would have now been attained but for the loss of several of the original members who withdrew for various reasons after some years of testing work. The herds of five of them had reached the

average production of 350 lb. of butter-fat per cow. Had these farmers remained in the test, the standard as shown on the graph (page 198) would have been still higher.

There are now 76 members in the Association. The last two units were formed owing to the increasing demand for, and interest in testing work.

A rather remarkable feature of the work is that, while seven years ago cows capable of producing 2.5 lb. of butter-fat daily were very rare, and 2 lb. a day cows were by no means common, in the test of October last no less than 88 cows and heifers reached the 2 lb. a day standard. One cow produced 3 lb., and several topped the 2.7 lb. mark. More than one heifer exceeded the 2 lb. standard, and another, 27 months old, produced 62 lb. of milk on three times a day milking.

"Ann" 13-year-old.

Her sire was "Merrygirl's 4th son of Noble", and she is therefore a granddaughter of the famous "Pretty Noble" (impt.). Her record for the present lactation is butter-fat 453 lb., a daily average of 2.32 lb.

Table III.—Showing Results from the Three Units of the Yinnar Association during October and November, 1928.

Unit.	Number of Pure-bred Certificated Bulls.	Number of Cows giving over 2 lb. Butter-fat.	
		October.	November.
No. 1	22	46	44
No. 2	13	26	28
No. 3	9	16	16

In the breeding of better dairy cows the Yinnar district is at least equal, if not superior, to any other part of the State. In no small measure the high production of some of the soldier settlers' herds is due to the test work of the original members of the Herd Testing Association, many of whom have been using bulls bred from the highest producing pure-bred cows in the State.

The foundation cows of many local herds that have been built up in recent times were drawn from herds belonging to original members whose average production has been well over the 300 lb. standard for several years past.

Heifers from proved cows are in keen demand. One member has booked up all surplus stock for two years ahead. The progeny of the proved bull is generally more highly valued in this area than in any other district known to the writer.

There is a very general acceptance of the fact that if the production character is to be built in to the herd, it can be done only by *concentrating on that character.* Some striking instances of this is seen in many of the district herds.

The use of the "high quality" pure bulls has been responsible for much development in the dairy type as well as the production of their "grade" daughters.

Some Yinnar Results.

On the share farm of Messrs. Bennett and T. Quigley are to be seen some splendid grade Jerseys by "Banjo of Warenda," *ex* "Charmion," a 523 lb. butter-fat cow.

During the present season four of his daughters have produced as under:—

Table IV.—Yields from Four Cows, Daughters of the Bull "Banjo of Warenda."

Name.	Age.	Days in Milk.	Lb. of Milk to Date.	Test.	Lb. of Butter-fat to Date.
	Years.				
Bluey	4	27	1,151	6·4	74·3
Peggy I.	3	33	1,452	4·6	66·8
Banjolene	5	90	3,985	5·5	221·0
Victory II.	4	273	7,585	5·3	404·1

It will be noticed that the first three cows have averaged better than 2 lb. of butter-fat daily for the period shown—

"Bluey" as a 3-year-old produced 410.7 lb. butter-fat.
"Banjolene" as a 4-year-old produced 386.2 lb. butter-fat.

In 1927-28, 34 cows averaged 303 lb. butter-fat.

Table V.—Showing Yields of Nine Different Mature Cows and of their Daughters (Heifers) by "Mistletoe's 2nd Treasure of Lynnely."

Dams.	Age.	Days in Milk.	Lb. of Milk.	Average Test.	Lb. of Butter-fat.	Daughters.	Age.	Days in Milk.	Lb. of Butter-fat to Date.	December Tests.		
										Milk.	Per cent.	Butter-fat.
	Years.						Years.					
Plum	9	273	5,677·2	4·46	254·2	Plum II. ..	2	104	= 131·0	23·5	5·4	= 1·26
Jewel	5	212	3,868	5·77	= 223·5	Jewel II. ..	2	136	= 187·5	21·5	5·4	= 1·16
Toughy	10	273	6,420	4·10	= 263·2	Toughy II. ..	3	131	= 193·0	22	5·9	= 1·29
Primrose	11	273	6,908	4·58	= 317·2	Primrose II. ..	3	128	= 163·8	24	4·5	= 1·08
						Primrose III. ..	2	78	= 158·7	37	5·5	= 2·03
Scottie	10	273	8,011	4·38	= 351·5	Scottie II. ..	3	117	= 185·6	25·5	6·1	= 1·57
Loafer	6	273	5,563	4·59	= 255·7	Loafer II. ..	2	111	= 168·7	22	6·2	= 1·36
Dot	11	273	6,197	4·56	= 283	Dot II.	2	107	= 146·0	22·5	4·8	= 1·08
Daisey	6	273	6,509	3·86	= 317·2	Daisey II. ..	3	94	= 126·9	25	4·4	= 1·10
Speckles	12	273	6,548	4·73	= 309·7	Speckles II. ..	3	110	= 154·0	21	4·8	= 1·00
						Speckles III. ..	2	111	= 139·3	19	6·2	1·17
						Treasure ..	4	218	= 331·7	15·5	6·2	·96
						Dulcie	4	136	= 221·0	20·5	5·4	1·10

"Mistletoe" heifers averaged 160 lb. of butter-fat in a 102-day average period, and were averaging 1.28 lb. per day in December. Their average age is 2½ years.

Dam's average age is 8.2 years; average butter-fat is 286 lb. in an average period of 266 days.

Two 4-year-olds by "Mistletoe" averaged 276 lb. in an average period of 177 days.

"Primrose III." is an outstanding heifer, her production being slightly better than 2 lb. of butter-fat daily for the first 78 days of her present lactation.

Her record card reads as under:—

Daily Milk.	Test.	Daily Fat.	Total Milk.	Total Fat for Period.
lb.		lb.	lb.	lb.
33	5·7	1·88	594	33·85
38	5·6	2·12	1,140	63·84
37	5·5	2·83	1,110	61·05

The present herd sire on one of Mr. Quigley's share farms is "Mistletoe's 2nd Treasure of Lynnely," *ex* "Mistletoe II. of Tarnpir," who through her sire was a great-grand-daughter of the famous imported Jersey bull "Pretty Noble."

"Mistletoe" was top heifer in 1920 in the 2-year-old class of the Government test; out of 147 of all breeds, her record was 7,900 lb. milk, 5.69 per cent., 449 lb. butter-fat.

During the last two years ten 2-year-old heifers by "Mistletoe's 2nd Treasure" averaged 239 lb. of butter-fat in a herd of 39, the herd average for the same period being 235½ lb.

"Mistletoe's 2nd Treasure," together with another bull of similar breeding, was purchased at the Royal Show for the sum of £8 10s. Both bulls failed to raise a bid at auction. On ascertaining the production of their dams, Mr. Quigley purchased both in order to secure "Mistletoe's Treasure." A perusal of the records of his fourteen daughters undergoing test this year will show that this confidence was not misplaced. The *production of the dam* was but an indication of what might have been expected—the test record of his daughters supplies the proof positive of the bull's worth.

The records shown in Table V., on page 201, were obtained from pasture feeding only. Eleven of these cows on their first or second calf are shown to have yielded in 102 *days* an amount of butter-fat estimated to be the average *yearly* production per cow in Victoria, viz., 160 lb.

Mr. Quigley has recently purchased two other young bulls; as in his previous purchase, the production of the dams was the deciding factor in the purchase.

The leading herd in the Yinnar Association is owned by Mr. G. Horsburgh, a soldier settler, who milks sixteen cows single-handed, and carries out all of the necessary farm work. During 1927-8 his herd, including one 2-year-old and four 3-year-olds, produced the splendid record of 411 lb. of butter-fat per cow. This record is likely to be very substantially increased during the current season. The herd

has been mainly selected on the Herd Test Association records, for Mr. Horsburgh was prepared to pay for proved cows. He has now secured "Romany Lad of Bellara," whose dam as a senior 2-year-old on her second calf produced 8,369 lb. of milk of 4.56 test, equal to 381 lb. of butter-fat. Prior to joining the Association, Mr. Horsburgh had decided to cull one of his untested cows, because she was always in "butcher" condition. However, she was spared, and her record below proves the fallacy of choosing dairy cows on appearance:—

Season.	Milk.	Average Test.	Butter-fat.	Days in Test.
	lb.	Per cent.	lb.	
1926–7 ..	9,058	4·77	432·8	273
1927–8 ..	9,116	4·53	430·3	273
1928–9 ..	3,591	4·61	165·5	79

Marvel. **Dina.**

Two of Mr. R. W. Thomas' Herd.

Marvel is milked three times a day and has produced in 24 hours 64 lb. milk testing 3.1 = 1.98 lb. butter-fat.

Dina is a Jersey-Friesian cross, and is the leading 2-year-old of the Yinnar Association.

The average daily yield of butter-fat during the current season is 2.1 lb.

"Ann" is a striking example of how cows that have been well cared for will remain profitable producers. She is thirteen years old. Her record for the past two seasons and for 1928-9 is interesting.

Year.	Days in Test.	Milk.	Average Test.	Butter-fat.
		lb.	Per cent.	lb.
1926–27 ..	273	8,088	5·82	471
1927–28 ..		After a serious setback.		389
1928–29 ..	195	..	..	453

The pasture mixture used by Mr. Horsburgh consists of—

Perennial Rye	.. ..	1 bushel.
Cocksfoot	.. ..	10 lb.
White Clover	.. ..	2 lb.
Red Clover	.. ..	2 lb.

All the grass land is top-dreseed every year, 1 cwt. of super. being used. Nine acres is given up to red clover and 10 acres to Japanese millet; the millet is sown at the rate of 20 lb. per acre, and a dressing of 90 lb. superphosphate is given.

Mr. Wm. Rintoul, a soldier settler, milks nineteen cows. In October the herd average was 1.73 lb. butter-fat. The herd sire is "Count II. of Leisterfield," *ex* "Graceful Countess," by "Quality's 6th Son of Melrose." The leading cow, "Winnie," was bred by

"Beauty," one of the Herd of Mr. G. Horsburgh.

Mr. Horsburgh at one time thought this cow carried too much condition to be suitable for dairying. Testing, however, proved her to be an exceptionally good producer. Her record is:—

1926	..	412.5 lb. butter-fat
1927	..	413.3 lb. butter-fat
1928	..	432.8 lb. butter-fat.

Messrs. Smith Brothers, whose herd produced 370 lb. butter-fat per cow in the Mirboo District Herd Test Association last year. "Winnie's" record is as follows:—

Season.	Days in Milk.	Milk.	Average Test.	Butter-fat.
		lb.	Per cent.	lb.
1927–28 ..	273	10,866	4·80	522
1928–29 ..	96	3,570	6·16	207·5

Her average daily yield of butter-fat for the first 76 days of this season was 2.73 lb. butter-fat. Her October test was 61 lb. milk of 5 per cent. test, equal to 3.05 lb. butter-fat. Messrs. Smith Brothers have used "tested" bulls for many years. Their herd average for 1928 was 370 lb. butter-fat per cow.

Mr. E. Hogan's herd average has increased from 280 lb. butter-fat per cow to 363 lb. per cow. The grass mixture used on Mr. Hogan's farm consists of—

Perennial Rye ..	1½ bushels.
Cow Grass	4 lb.
Dutch White Clover ..	3 lb.

The paddocks are top-dressed annually with a bag of superphosphate per acre.

Mr. Hogan has won the prize for the three best 2-year-old heifers in the association. The trio included two daughters of "Butterwinks III. of Jersey Hill," whose dam was "Tiddlewinks II. of Holmswood," champion production cow in the Standard Test in 1919. These heifers were purchased from Messrs. Walker Brothers, one of the foundation members of the Association. They were in the foremost rank in the 2-year-old class, and a year later in the 3-year-old class. This year, in more than one monthly report, they have been included among the six best cows. Their high average test is an outstanding feature.

Table VI.—Three-year Records of Two Daughters of "Butterwinks III. of Jersey Hill," *ex* "Tiddlewinks II. of Holmswood."

Name.	Age.	Days in Test.	Milk.	Per cent.	Butter-fat.
	Years.		lb.		lb.
Butterwinks, by Butterwinks III. of Jersey Hill	2	273	4,431½	7·08	= 319·95
" " " "	3	273	5,431½	6·95	= 377·86
" " " "	4	143	4,597	..	304·
Pet, by Butterwinks III. of Jersey Hill..	2	273	6,099	5·94	= 362·67
" " " " ..	3	273	6,603	6·22	= 411·08
" " " " ..	4	181	5,846	..	340·0

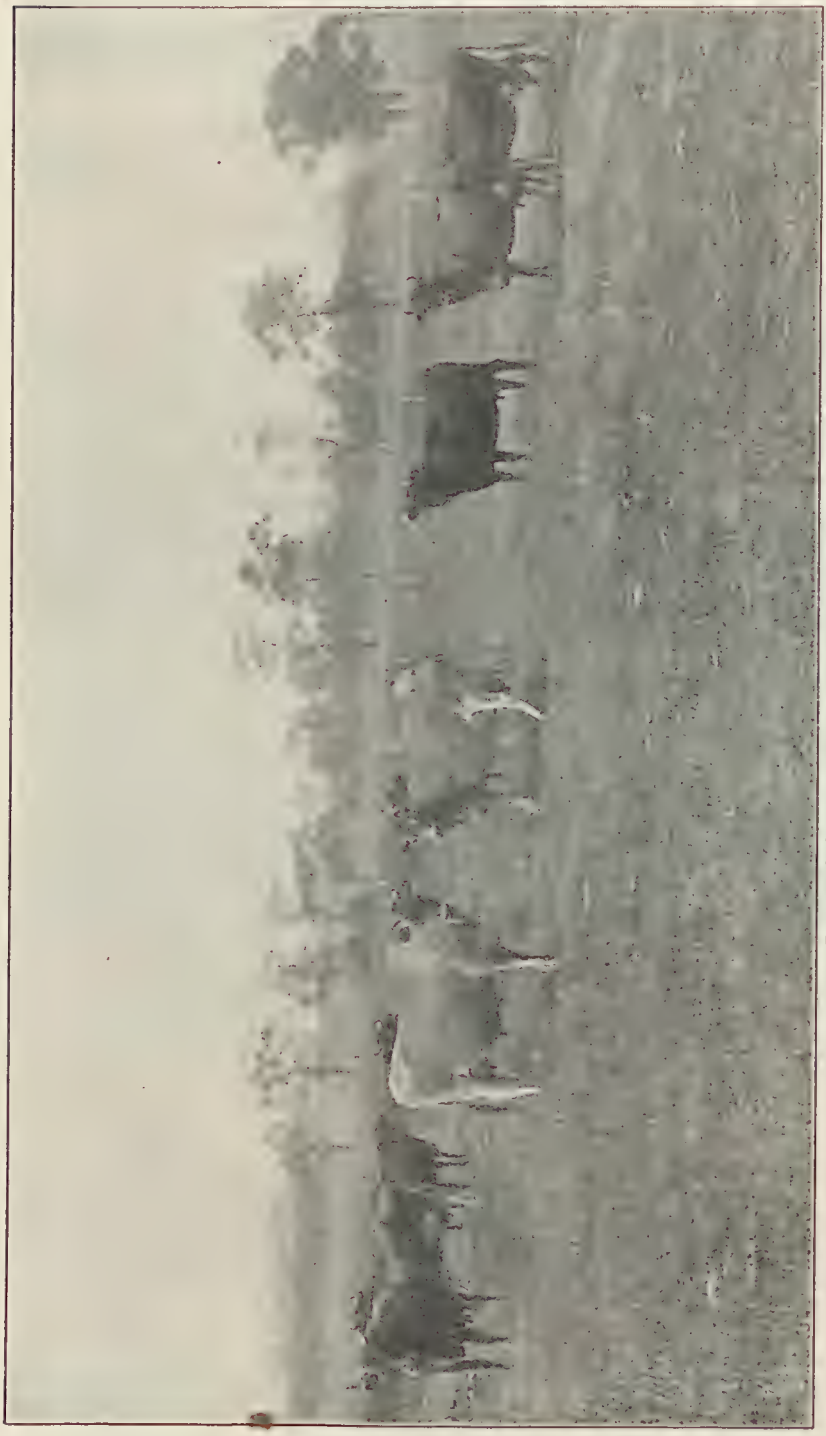
Mr. Stan Thomas, also a soldier settler, has an improved herd average of 151 lb. per cow as under:—

Season.	Milk. lb.	Butter-fat. lb.
1924	4,286	214
1928	6,453	365½

His best cow produced 10,561 lb. milk of 4.43 per cent., equal to 468 lb. butter-fat. A junior 2-year-old grade Jersey in this herd has the second best record for the Association. It is as follows:—

Milk. lb.	Test. Per cent.	Butter-fat. lb.
8,089	4·67	378·5

The herd sire now used is a son of "Ringtail of Tarnpir," by "Graceful Lad of Leisterfield." "Ringtail of Tarnpir" has a record as a 2-year-old of 380 lb. butter-fat in the Standard Herd Test.



Some of the Herd of Mr. Geo. Horsburgh.

Last year the average for 18 cows and heifers was 400 lb. butter-fat. During present year several cows in Mr. Horsburgh's herd had produced over 400 lb. butter-fat seven weeks before expiration of period of test.

Although the Jersey breed has a very strong following in the Yinnar district, it is not without some opposition.

Friesians have been introduced by Mr. J. F. Williams, one of the original members of the Association. "St. Albans Ransome King" was the first bull of this breed used by him. The herd was then mainly Jersey grades. Mr. Williams has long favoured the "production bred" pure bull. Sons of such cows as "Jubilee 15th" and "Merrygirls 4th Son of Noble" have been used. Among some fine cows bred by Mr. Williams was "Dina," the highest producing 2-year-old of the Association. This cow's dam was "Joe II.," from a family of good producers, and her sire was "Ransome King." Her record as a junior 2-year-old was 380 lb., and she has proved a very consistent milker. Her full record is as follows:—

Table VII.—Record of Dina, *ex* Joe II., by Ransome King.

Year.	Age.	Days in Milk.	Lb. of Milk.	Average Test.	Lb. of Butter-fat.
	Years.				
1924–5	2	273	8,945	4·24	380
1925–6	3	273	7,165	4·33	310
1926–7	4	273	7,556	4·37	330
1927–8	5	273	9,360	4·44	416
1928–9	6	186	8,334	4·0	332·1

"Dina" has averaged nearly 1.8 lb. of butter-fat daily for 186 days of the present season.

"Lulu," *ex* "Ann," now in Mr. Horsburgh's herd, is also a splendid producer. She has produced better than 5 gallons a day, despite the loss of a quarter.

There are eleven 3-year-olds, six 2-year-olds, and four mature cows in Mr. Williams' present herd. The October test was 36.5 lb. of milk and 1.5 lb. of butter-fat. Five 2-year-olds and one 3-year-old by "Burnbank Oaklea Fobes," a son of "Dominion Violet Fobes," by "Rock Patch," are particularly nice type dairy cows, and are yielding well.

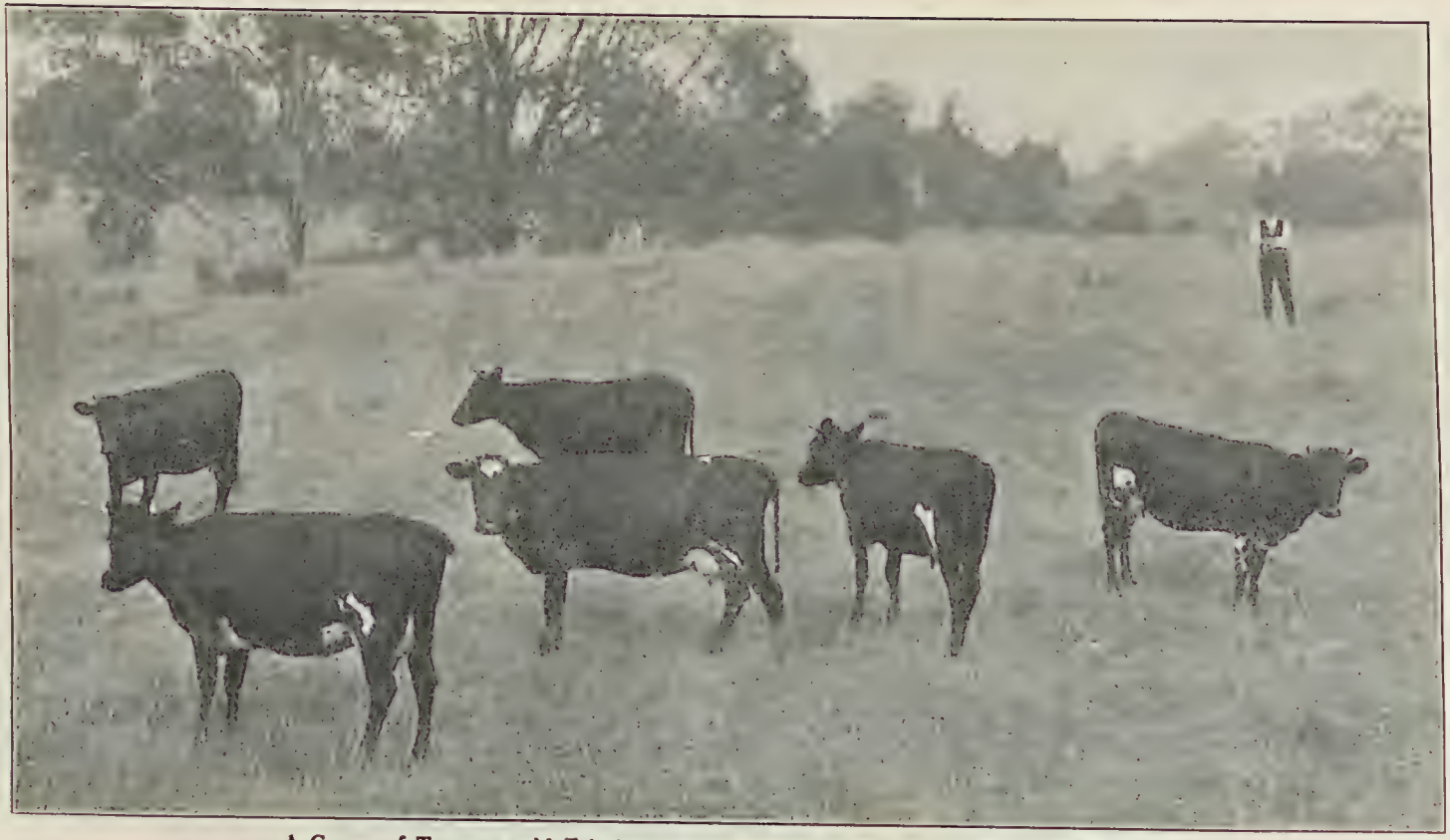
Table VIII.—Yields of Five Heifers (by "Burnbank Oaklea Fobes") in the Herd of Mr. J. F. Williams.

Name.	Age.	Days in Milk.	Lb. of Milk.	Average Test.	Lb. of Butter-fat.
	Years.				
Freda	3	79	3,911	4·0	156·7
Myrtle	2	84	2,919	4·24	123·6
Plum	2	54	1,878	4·73	86·0
Bubs	2	54	1,653	4·65	77·0
Edie	2	54	1,787	4·20	75·0

"Freda's" record for 79 days is almost 2 lb. daily.

The present herd sire is "Homeleigh Van Oak," whose two nearest dams have an average butter-fat production of 684 lb.

Mr. R. W. Thomas now owns "Dina," and has a 2-year-old daughter from her by "Burnbank Fobes Patch." This heifer is as good a producer as her looks suggest her to be. She started her



A Group of Two-year-old Friesian grade Heifers in the Herd of Mr. J. F. Williams.

Their sire was "Burnbank Oaklea Fobes," a son of "Dominion Violet Fobes." The present herd sire is "Homeleigh Van Oak," the average of whose dam and granddam for one season was 684 lb. butter-fat.

lactation at 24 months, and has reached 64 lb. a day on three times a day milking. In 176 days she has produced 9,986 lb. of milk, testing 3.06 per cent., equal to 305.73 lb. butter-fat. A half sister owned by Mr. Dave Williams has also shown up well under test. In 71 days her record on twice a day milking is 2,935 lb. of milk, testing 3.45 per cent., equal to 101 lb. butter-fat. In the first year of test Mr. Williams' herd of fifteen cows averaged 276 lb. butter-fat.

Table IX.—Herds that Reached the 300 lb. Butter-fat Standard with Allowances for Heifers, 1927-8.

Name of Association Member.	Number of Cows Finish Test.	Herd Average with Allowances. Lb. of Butter-fat.	Composition of Herd.		
			Mature Cows.	3 Years. Receives 25 lb. Allowance.	2 Years. Receives 70 lb. Allowance.
G. Horsburg	18	411·77	13	4	1
Wm. Frew	15	370·55	14	1	0
A. Dritrick	15	369·69	12	1	2
S. G. Thomas	23	365·45	13	2	8
A. G. Fox	27	360·87	16	2	9
R. W. Thomas	11	352·96	7	2	2
H. M. Thompson	16	350·91	13	0	3
W. G. Rintoul	19	349·69	15	2	2
Walker Bros.	31	345·47	25	6	0
G. McFarlane	17	341·73	11	4	2
E. Hogan	23	341·41	13	3	7
S. D. Young*	11	337·86	6	2	3
Collins Bros	25	334·18	23	2	0
R. L. Grauer	12	330·41	9	3	0
G. Bond	29	327·19	18	6	5
G. Atkinson*	18	322·57	16	0	2
A. McFarlane	22	321·03	11	4	7
E. R. Loviston	30	320·93	12	8	10
D. McFarlane	19	314·15	11	6	2
A. Caldwell*	14	310·45	10	2	2
Quigley Bennetts	34	303·33	20	7	7
Wm. Medew*	15	302·06	5	2	8

* Members of No. 2 unit, transferred from No. 1 unit. All these members use a "production" purebred bull.

Many of the cows in the "mature" section are now milking on their third or fourth calf. Only *good* cows remain to be *old* cows.

So Much Done—So Much to Do.

Yinnar Association is the first in this State to reach the 300 lb. standard. It is probably the first in Australia. As against this, we must not forget that Denmark has her associations with a 450 lb. butter-fat per cow average. Michigan State, U.S.A., has 82 associations that have passed the 300 lb. mark, ten being over 350 lb. Wiscousin State also has 59 associations which have equalled this standard. The Danes have equalled this figure for all cows in their country. New Zealand dairymen have made it the goal of their ambition, and are seriously setting out to attain it.

A great deal has already been accomplished in the leading Associations in this State, but there is still room for much improvement.

Rigorous culling of the low-producing cows must go on, irrespective of whether they be pure bred or grade.

Reasons for Yinnar's Success.

Summarizing the reasons for progress at Yinnar, the main factors for improvement appear to be—

1. A heavy culling of the Association herds. In some herds up to 50 per cent. of the herds have been speyed.
2. Rational feeding of the cows when in milk and when dry; more attention to legume hay and fodder conservation; and the top-dressing of pasture.
3. The extensive use of pure-bred bulls from proved high production cows.
4. An extensive acceptance and practice of the proved practical ideas of successful district dairy-farmers.

Better bred, better fed dairy cows is the general practice.

Mr. E. Hogan's "Butterwinks" Heifers.

"Butterwink III. of Jersey Hill" is *ex* "Tiddlewinks II. of Holmswood" a double-cross "Audrey Lord Taylish" cow. "Tiddlewinks II." was champion cow in the Standard Herd Test in 1919. These two heifers were bred by Messrs. Walker Bros., who are foundation members of the Yinnar Association. Their records are:—

"PET."					"BUTTERWINKS."				
Age.	Days in Test.	Milk.	Test.	Butter-fat.	Age.	Days in Test.	Milk.	Test.	Butter-fat.
		lb.	%	lb.			lb.	%	lb.
2	273	4,431½	7·08	319·98	2	273	6,099	5·94	362·67
3	273	5,431½	6·95	377·86	3	273	6,603	6·22	411·08
4	143	4,597	—	3..4	4	181	5,846	—	340

Acknowledgment.

For the figures in several of the foregoing tables, I am indebted to Mr. A. Driffield, secretary of the Yinnar Herd Test Association, and I take this opportunity of expressing my thanks to him.

STOCKS FOR FRUIT TREES.

By H. W. Davey, Chief Orchard Supervisor.

The stock of a fruit tree is that part on which any other variety is worked, either by grafting or budding. The graft or the bud that is worked on the stock is known as the scion. The selection of stocks is very important, for the productivity of the mature tree will largely depend on the habits of its root system.

Results from grafts of certain plants on other plants will range from success to complete failure, and the capricious occurrence of successful and unsuccessful grafting or budding is sometimes inexplicable.

For success in grafting or budding (apart from the mechanical part of the work) there must be a certain compatibility in the parts to be united as regards their growth and their soil and water requirements.

Botanical relationship is, to some extent, a guide as to what plants can be successfully grafted or budded on to each other, but this cannot always be referred as a sure guide. Take, for instance, the apple and pear; these are less congenial to each other than is the pear to the quince, yet the pear is more closely related to the apple than to the quince. Indeed, it is claimed that the pear works more readily on the quince than does the Portugal quince on other varieties of quinces.

Adaptability to environment is as important as is congeniality between scion and stock. Congeniality, of course, makes for successful budding or grafting between stock and scion. Adaptability refers to the ability of the combined parts to adapt themselves to soil and climate, either of which may be more suitable to one than it is to the other.

For example, an apricot on peach stock makes a congenial union, but the apricot is most suited to a heavy soil, while the peach roots favour a soil of a lighter nature. Again, a pear worked on quince stock would require more water and manure than would a pear worked on seedling pear stock, owing to the quince roots being more limited in their range.

Adaptability to soil and water requirements is usually known beforehand, but congeniality between scions and roots has to be ascertained by testing out varieties.

Seedling stocks will without doubt give better results as regards vigor than either cuttings or suckers.

Apples.

In the case of apples, seedlings are not usually employed in Victoria owing to the liability of the roots of most of them to attacks from woolly aphis. Consequently blight-proof stocks, vegetatively propagated, are chiefly used. Apples worked on seedling stocks, however, develop into much more vigorous trees, and usually will rapidly outgrow those worked on roots or stocks taken from blight-proof trees.

Apples on selected Northern Spy roots generally make better trees than those worked on growths taken from Spy stools. In the case of the stools, some of them may be cut over for many years and become devitalized, with the result that trees worked on them are more or less dwarfed and lack constitution.

As the seed from blight-proof apple trees does not necessarily produce a blight-proof seedling, it is usual in Victoria to work apple trees on portions of blight-proof roots. There are different methods adopted to obtain this result. One is to select pieces of roots from young blight-proof nursery trees, such as Northern Spy, Winter Majetin, Magg's Seedling, and French Paradise; the roots of the Northern Spy are the most commonly used. The method of root-grafting apple trees is as follows:—A piece of Spy root from 2½ to 3 inches long is cut with a sloping cut and tongued; then a piece of the previous season's Spy wood 4 inches long is cut and tongued in the same manner at its basal end. These pieces are inserted into each other and tied securely with raffia; afterwards they are planted out in nursery rows with only the topmost bud exposed above the surface of the ground.

Soon after planting, the Spy root becomes active, and the Spy scion also sends out roots above where it is grafted, and these roots ultimately become the root system of the future tree. The desired variety is later budded or grafted on to the wood extension which grew from the bud left exposed above the surface of ground when it was planted.

Early bearing is favoured by grafting or budding, and precocity of fruit-bearing is necessary to the success of any variety of fruit grown commercially. The chief reason why such a fine apple as the Northern Spy is so little planted is its slowness in coming into bearing.

The raising of stocks for apple trees by what is known as Spy stools is accomplished by having rows of young Spy trees bent down into a trench 8 inches deep and covered with soil. From these shoots will arise, and they may be cut away from the parent stem and planted out in nursery rows. If care is exercised when removing the stocks by leaving basal buds, these stools can be made to produce stocks almost indefinitely.

If, as is usually the case, the stools are kept in commission for very many years, a large proportion of the shoots arising from them may become very small and debilitated, and will pass on their debility to the trees worked on them. These weakly Spy stocks when budded or grafted high up are often the cause of aerial roots appearing on the stems of apple trees, and sometimes give rise to the supposition that the trees are suffering from Hairy Root.

Pears.

Pears are usually propagated by being worked on pear seedlings, as these make first-class stocks for Standards and Orientals. Seed for this purpose should be selected from well-grown fruits of known parentage, and not from the cheapest rubbish.

Varieties such as William Bon Chretien, Keiffer, and Chinese Sand Pear are most in favour for this purpose. In all cases the fruit must be fully ripe.

The seed is sown in strips of from 6 to 9 inches and 3 feet apart on clean land. By having the rows 3 feet apart, cultivation, which is very important for the purpose of keeping in check competing weeds, may be carried out. The following season the seedlings should be planted out in nursery rows, and will usually be fit for budding in February or March.

Any weakly seedlings should be taken out and burnt, for they will grow into weak trees. Double-worked Winter Nelis has given good results, that is, by budding a seedling stock with William Bon Chretien, and later budding the latter variety with Winter Nelis.

Pears may be dwarfed by working them on to the Angiers quince stock. Many commercial varieties of pears have a poor affinity with the quince stock, and are so conspicuously defective in uniting that they necessitate a resort to doubleworking. Either Buerre Hardy or Buerre Diel, however, makes an excellent union with the quince, and the desired variety can afterwards be worked on either of them. This constitutes what is known as double-working. These dwarf pears are very precocious in fruiting, coming into bearing early, and producing regular crops every year.

As pear roots are now liable to be attacked by aphis, it appears that in the near future pears will have to be worked on blight-proof stocks, as is done with apples. The Horticultural Division of the Department of Agriculture is at present growing seedlings with a view to obtaining a blight-proof stock, which, in addition to having congeniality when worked with commercial pear varieties, will make a good strong union, and not outgrow the stock. The pear which promises best for this purpose is *Pyrus calleryana*, numbers of which are being grown at the Burnley School of Primary Agriculture. Dwarf pears owing to their being worked on quince roots are immune from attack by aphis. Pear suckers are sometimes used for pear stocks, but are most unsatisfactory, and on no account should they be used.

Plums.

Several stocks for plums have been in favour from time to time, such as Marianna, St. Julian, Myrobolan, and La France. The best all-round stock for the European plum is the French Cherry Plum, La France, often called by nurserymen Myrobolan. This variety makes a good union with the commercial varieties, and does best in deep fertile and rather heavy soils.

The Marianna stock is not recommended, being more sensitive to wet soils and less drought-resistant.

Plum stocks are usually propagated by means of cuttings from 12 to 15 inches long, planted out in nursery rows at the end of July or early in August. But if seed is procurable, it should always be used, for it will give much better stocks than those from cuttings.

Almond stock is sometimes used for plums in soils of a lighter and drier condition than is most favored by plum stocks. Peach stocks are also used for what is classed as peach soils, but some prunes appear to lack affinity for the peach root, and are refractory on this stock.

Peaches.

Peaches do best on their own stock in what are known as peach soils, such as sandy loams overlying a friable sub-soil, intermixed with sands affording good drainage. The wild Chinese peach stock—*Prunus Davidiana*—is said to be more tolerant of the presence of alkali in the soil, and should be of value as a stock in some parts of Victoria.

Plum stocks have a dwarfing effect on the peach. In very poor sandy soils the almond makes the best stock for the peach owing to its strong-growing root system, which gives it a greater range for root pasturage.

Apricots.

Apricots are usually budded on seedling apricots. This stock thrives best in fairly heavy soils, but must have good drainage. If the soil is of a light nature, then the peach stock gives better results.

On very sandy soils unsuited for either the plum or peach stock almond stocks can be used, but owing to its lack of congeniality with the apricot, it becomes necessary to double-work them, that is by first working the peach on the almond and later budding the apricot on the peach.

The Myrobolan stock for apricots is used on land of too heavy and retentive a nature to suit the apricot. On such soils apricots worked on this stock produce good crops of fruit. A drawback to the use of the plum stock for the apricot is that sometimes the union is faulty and trees are liable to blow off during very strong wind.

Cherries.

The stock most in favour for cherries is that of the seedling Black Mazzard. Trees on such stocks grow vigorously owing to the congeniality between them and commercial varieties of cherries.

The Kentish stock has a dwarfing effect on trees worked on it, but they are very fruitful. The dwarfing effect is due to the variety worked outgrowing the Kentish stock. Trees worked on Kentish stock can usually be recognized by the variation in the size of the trunk at the point where the union has been made. A drawback to the use of the Kentish cherry is its suckering habit.

The Mahaleb is not recommended as a stock for the cherry, for, although very hardy in either wet or dry conditions, the life of trees worked on it are usually short as compared with those on the Black Mazzard.

Almond.

Almonds grown commercially for their fruit should not be raised from seed, excepting for the purposes of stocks. Like other fruit trees, if grown from seed, they will not come true to type, but should be worked in the same way as are other fruits. They are best budded with the desired variety on almond seedlings.

The bitter almond is frequently recommended and used as a stock, but there is no evidence available to prove that it makes a superior stock to that of the sweet almond.

Almonds do well on peach stocks, and will make large trees, but those on plum stocks are usually the reverse, yet the sugar prune does well on the almond.

Myrobolan plum stock is sometimes employed for almonds on poorly drained land. The union is usually good, but as the plum grows slower than the almond a dwarf tree results.

Most stone fruits, particularly peaches, plums, and prunes, unite readily with the almond, and the latter can be worked over with these if desirable, but as already stated, the apricot and almond are recalcitrant, necessitating a double-working by using peach wood between, otherwise the union will be faulty.

Walnuts.

The raising of walnut trees from seed without budding or grafting is a very common mistake. Even when seed is taken from trees of a good bearing type, the seedlings often vary so much from the parent as to be of little or no commercial value.

Seedling trees seldom reproduce true to the parent type either in form, thinness of shell, plumpness of kernal, and usually fail in productivity, and it is now becoming recognized that if a person desires to grow walnuts commercially he must rely upon either budded or grafted trees.

At present, hardly any two trees are alike as regards production. Last season the writer saw a good illustration of this in the Bright district. Two walnut trees of the same age were growing close together under, we may reasonably assume, the same conditions as regards soil, moisture, and atmospheric conditions. One of them produced three bags of nuts of 70 lb. each; reckoning nuts as worth 1s. per lb., the total value of the year's produce was £10 10s. Trees of this description, if planted on the 40 feet x 40 feet arrangement, or 27 trees to the acre (providing all were equally productive) would yield nuts to the value of £283 per acre. Yet the tree growing alongside this prolific specimen produced only a few pounds of nuts.

If scions were taken from the former tree and worked on to a seedling stock, this prolificacy could be perpetuated, as is done in the case of other orchard trees.

The trouble is that the demand for walnut trees has enabled many trees of unknown parentage to be sold, which, when coming into bearing, have proved to be unprofitable. Success cannot be hoped for, if ungrafted trees are planted.

Although the common walnut—*Juglans regia*—makes a good stock on which a proved variety of nut can be worked, it is now generally recognized that the Northern California Black Walnut, *Juglans hindsii*, makes the better stock, being much more resistant to disease and sun scald than is regia. It is also an extremely thrifty tree under most conditions, and has proved itself to be much the best stock on which to work commercial varieties of walnuts either by budding or grafting.

RUTHERGLEN CROP COMPETITION, 1928.

Report of Judge W. B. Miller, M.Agr.Sc., Inspector of Agriculture.

The high standard of the 23 entries judged in the third wheat crop competition conducted by the Rutherglen Agricultural Society indicated that good yields would be obtained in that district. It was expected that the average yield of all the crops exhibited would be nearly ten bags per acre, whilst in some instances substantially higher yields were expected.

The season was a favorable one, though not ideal. The summer and autumn rains were phenomenal. During the first four months 20 inches were recorded at Rutherglen, but only 9 inches fell during the remainder of the year. Although such heavy autumn rains made the cultivation of the fallows rather difficult, the majority of the crops were sown early, and germinated well. Late sown crops were a comparative failure. The winter rains, though lighter than usual, were sufficient to maintain steady growth until the dry spell in August and September, when it was noticed that the plants had not stooled so heavily as in 1927. The spring rains of from 3 to 4 inches ensured a good harvest, but yields were reduced considerably by the presence of red rust.

The average annual rainfall in the Rutherglen district varies from 21½ to 22½ inches. Usually the winter and spring rains are sufficient for the wheat crops. In some years the winter rainfall is so heavy that the heavy clay ground becomes waterlogged. When this occurs high yields are seldom obtained. Probably the most essential factor for successful wheat-growing in such a district is to give the crop a good start by sowing early on a well prepared seed-bed.

The wheat crops at Rutherglen may be divided into three classes:—

1. Those sown on fallowed land.
2. Those sown on "lay" land, that is, land which has been out in pasture for some years, and is then ploughed and sown in the autumn.
3. Those sown on wheaten or oaten stubble land.

The leading crops in the competitions at Rutherglen during the past three years have been grown principally on early and well fallowed land, but in a few cases excellent crops have been produced on "lay" ground that has been ploughed early in the autumn.

Seldom does the stubble crop yield well, and although the past year was an ideal one for non-fallow crops, not one of the 23 exhibits in the competition was sown on stubble land.

Crops Sown on Lay Ground.

As sheep feed was plentiful following the heavy summer rains, an exceptional opportunity was offered for farmers to bring back into cultivation at small cost those grass paddocks which had been temporarily spelled. When such paddocks were ploughed in February, or early in March, and then cultivated after the autumn rains before sowing, a great deal of moisture was conserved, many weeds were killed, and a good seed-bed was prepared. Such land could be expected to carry a heavy crop, and the results obtained this year justified the action of

those growers who grasped the opportunity. Messrs. Snart Bros., R. Milthorpe, and L. Whitehead grew very fine crops in this way.

Where "lay" ground was ploughed up later in the season (during April or May), poorer crops were obtained, and more "take-all" was noticed.

Crops Sown on Fallowed Ground.

It must be remembered that the area of wheat which can be sown on "lay" ground, even in a favorable year, is very small. Such a system is suitable for the exceptional, rather than for the average year. Early and well worked fallow is the most reliable and profitable basis for the wheat crop, even under Rutherglen conditions. Of the 23 competing crops, 17 were sown on fallowed land.

Tall Crop of Turvey Wheat grown by Mr. E. Mickan.

It appears that highest returns are obtained from a paddock when it is cropped with wheat or oats for some years, always sowing the wheat on fallow, and then allowing the paddock to go out to pasture again for several years.

The stock-carrying capacity may be increased by establishing subterranean clover and rye grass in the paddock before it is allowed to go back into grass. This practice has been found successful at the Rutherglen Experiment Farm, and on several private farms in the district.

The Competition.

Best 25 Acres of Wheat Crop.

The crops judged were representative of all parts and soils of the district. The season was said to favour the heavier clay soils, but good crops were seen on both the red loams and the grey cementy soils, and the heavier crops appeared to be a reflection of the methods used rather than of the soils on which they were grown.

Mr. S. Diffey's winning crop of Free Gallipoli and Marshall's No. 3 was grown in a paddock of heavy grey soil containing some red banks. The Gallipoli appeared to be the heavier crop, and was true to type. The Marshall's No. 3 variety was taller, thinner, and contained a few strange heads. Both varieties had been slightly attacked by rust, but were otherwise fairly free from disease. This crop was also very free from weeds, had well filled heads, and promised to yield well. Mr. Diffey's No. 2 entry in the same paddock was an even heavier crop, but the varieties were badly mixed.

The paddock was ploughed 4½ inches deep in August and September, and was harrowed twice in October. After the February rains, the

Fine Crop of Waratah Wheat grown by Messrs. Snart Bros.

rigid-tyne combine was used, and the crop was sown with the combine in the third week of April. Seeding was at the rate of 65 lb. with 1 cwt. of superphosphate per acre. The crop was not fed off. Two oat crops had been taken from this paddock since it was last cropped to wheat in 1924.

Messrs. Snart Bros. showed a tall crop of Waratah wheat growing on the slopes of a well-drained hill of red loam at Gooramadda. The heads were well filled and thick, though short compared with other varieties. The crop was free from disease, except for a little rust, and the only weeds seen were a few scattered saffron thistles.

The paddock had been out to grass for several years before it was ploughed in the first week of February. It was re-ploughed at the end

of April to bury the weeds that the cultivator could not kill. Ninety pounds of seed, with 90 lb. of super., were drilled in on the 21st May. The crop was not fed off.

Waratah is a good wheat for late sowing, but should be sown heavily. This variety is liable to shed its grain in a wind storm, therefore it would be unwise to sow too large an area with it.

The crop of Waratah grown by Messrs. R. Milthorpe and L. Whitehead closely resembled that of the Messrs. Snart, but was not quite so thick nor so true to type. It was free from disease, and very even, except for lighter patches on grey ground. The crop was grown on "lay" ground which had been in grass for six years. Ploughed in March, and scarified at the end of April, this paddock was sown in the first week of May with 70 lb. of seed and 90 lb. of super. per acre.

Mesrs. Dunn Brothers' tall crop of Major sown on fallow promised a heavy yield. The wheat was not quite true to type, and some patches of "take-all" reduced the yield. The crop was sown early in May with 75 lb. of seed and 100 lb. of superphosphate per acre.

The detailed results of the competition are set out in the table below:—

Details of Results.

Competitor.	District.	Variety.	Apparent Yield.	Purity of Type.	Absence of Disease.	Absence of Weeds.	Evenness.	Total.
Possible Points			**35**	**20**	**15**	**15**	**15**	**100**
S. Diffey, No. 1	Springhurst	Free Gallipoli and Marshall's No. 3	34	17	14	15	14	94
Snart Bros.	Gooramadda	Waratah	33	18	14	14	13	92
Dunn Bros. No. 1	Gooramadda	Major	33	17	14	14	13	91
R. Milthorpe and L. Whitehead	Brown's Plains	Waratah	32	17	15	14	13	91
J. McQuade	Norong	Free Gallipoli	32	17	14	14	13	90
C. Mickan	Carlyle	Turvey	30	18	14	15	13	90
E. W. Rosser	Norong	Federation	29	18	14	15	14	90
S. Diffey, No. 2	Springhurst	Federation	35	13	14	15	13	90
Melville Bros., No. 2	Brown's Plains	Free Gallipoli	29	18	14	13	12	86
R. W. Brown, No. 1	Carlyle	Waratah	24	19	15	14	13	85
Dunn Bros., No. 2	Gooramadda	Major and Free Gallipoli	29	18	12	13	13	85
F. Jacobson	Norong	Federation	27	18	14	13	12	84
R. Nicholson and R. W. Brown	Brown's Plains	Free Gallipoli	28	17	14	12	13	84
R. W. Brown, No. 2	Carlyle	Bena	28	17	14	13	12	84
Melville Bros., No. 1	Brown's Plains	Quality	25	18	15	13	12	83
F. Jacobson and W. Rosser	Norong	Marshall's No. 3	23	18	15	15	12	83
R. W. Brown, No. 3	Carlyle	Waratah	29	18	12	12	12	83
A. Potter	Brown's Plains	Free Gallipoli	27	17	14	12	12	82
F. Jacobson	Norong	Minister	26	17	14	13	12	82
E. Blampied	Carlyle	Turvey	26	17	14	12	12	81
H. and V. Chandler	Lake Moodemere		24	17	14	14	12	81
Graham Bros. and F. Hankinson	Norong	Federation	22	18	14	12	13	79
P. Gullifer	Lilliput	Free Gallipoli	22	18	14	13	12	79

By reference to the points awarded for yields, it will be seen that the majority of the remaining competitors had heavy crops.

The crops were very free from such diseases as ball smut, flag smut, and "take-all," but nearly all showed a little loose smut and considerable infection by red rust.

The number of cultivations given to the fallows in the autumn accounted for the cleanliness from weeds. Fewer wild oats than usual were noticed, and Cape weed had done little harm.

After the February rains, it was all important to return the beaten-down fallows to workable order. In some cases, neglected fallow had to be re-ploughed, and the loss of time so incurred at the rush period of the year prolonged the sowing period until it was too late to give the crop a good start.

In regard to the best depth of ploughing the figures obtained from cultivation trials on the grey cementy soils at the Rutherglen Experiment Farm are of interest.

CULTIVATION TRIALS—RUTHERGLEN.

—	Average Yield per acre for 14 years.	Yield, 1928.
	bushels.	bushels.
Ploughed 3 inches deep in July and well cultivated ..	20·7	27·4
Ploughed 5 inches deep in July and well cultivated ..	25·1	29·0
Ploughed 7 inches deep in July and well cultivated ..	26·7	32·5
Ploughed 5 inches deep in October and well cultivated	19·6	22·3

These tests indicate that, on such soils the best yields are obtained by ploughing to a depth of at least 5 inches, providing that no clay sub-soil is brought to the surface. The benefits of early fallowing, which are well recognized in the district, are also illustrated by the results of these tests.

Seed and Manure.

The average amount of seed sown per acre by competitors in the 1927 competition was 66 lb. This year, though sowing early, the amount was increased to 71 lb. per acre, but the seven leading competitors used 78 lb. per acre. In the great majority of cases, dry pickling with copper powders was practised.

The average amount of manure used was 79 lb. per acre, but the seven best crops were treated with 90 lb. per acre.

Free Gallipoli was the most popular wheat variety sown, but seven other varieties were tried.

NORTH-WEST MALLEE FALLOW AND CROP COMPETITIONS.

Zone 5.—Patchewollock and Baring.

Report of the judge, A. B. Hackwell, B.Agr.Sc., Science Field Officer.

A new series of fallow and crop competitions was inaugurated in 1928 in the north-west Mallee district, which has been divided into five zones. In each of these has been instituted a separate contest open to all farmers within that zone. The competition is for the best aggregate for 100 acres of fallow in 1928, and the crop grown on that fallow in 1929. The winner of each zone competition is to receive a trophy donated by the Royal Agricultural Society of Victoria.

The districts of Patchewollock and Baring comprise zone 5, and the report herewith deals with both the zone competition and the local competitions held within the zone.

The number of entries received for these various competitions totalled 71, namely, 39 for crops and 32 for fallows.

The Crops.

In common with most centres in the newer Mallee the early prospects of a good year were not realized, owing to the unusual season with its peculiar distribution of rain. Following on the heavy showers of the first four months of the year, approximately 6½ inches of rain fell in this district during the growing period from May to November inclusive, making the total for 1928 slightly less than 14 inches.

In most cases the late spring rains were a saving feature, but even so, the crops on the whole were well below average. Those on the heavier flats had suffered most severely, as they were almost beyond recovery when the late rains came.

There was considerable variation in the standard of the crops. Some tall, well filled, even crops were inspected, but a number of the entries, especially on the flats, had failed badly. Thirteen varieties were used in sowing the crops entered in the competition, and of these Federation was the most popular, with Free Gallipoli next. In this connexion the results of wheat variety trials conducted at Rainbow and Walpeup should be of interest.

At Rainbow, in 1928, six plots, sown to Free Gallipoli, gave an average yield of 24.6 bushels per acre, while the six Federation plots alongside averaged 18.6 bushels. Where Nizam was tested against Federation, six plots of the latter averaged 21.0, and of the Nizam 21.1 bushels per acre, and in the Ranee and Federation test, the former averaged 21.5 and the latter 21.4 bushels per acre.

At Walpeup the average yields for three years are as follow:—

	Bushels per Acre.		Bushels per Acre.
Sepoy ...	... 23.2	Nizam ...	... 19.7
Free Gallipoli	... 22.0	Yandilla King	... 19.5
Ghurka ...	... 21.9	Mogul ...	... 18.7
Rajah ...	... 20.9	Confederation	... 18.7
Ranee ...	... 20.7	Federation	... 18.6
Currawa ...	... 20.6		

These figures indicate that several of the newer varieties, and particularly Free Gallipoli, should prove more profitable than Federation.

A feature of the crops inspected was the low standard of purity of the seed. "Strangers" were abundant in most crops, and many contained a good deal of barley. It is suggested that farmers should purchase each year a few bags from a wheat-breeding station, and from that keep building up their own seed.

There was great divergence in the time of sowing the competition crops. This ranged from the end of April to mid-June, the majority of the competitors having put in their crops between the middle and end of May. An average of 58 lb. of seed and 83 lb. of super. per acre was used.

Wheat Diseases.

Disease, particularly flag smut, was fairly common throughout the crops. Ball smut was found in four exhibits and dead-heads in several. Rust was fairly general, but was not expected to cause any appreciable damage.

Following is a brief account of the four common wheat diseases, with methods for their control:—

Ball Smut.

The smut balls consist of millions of seeds (or spores) of this disease. When the balls are broken these seeds adhere to the outside of the wheat grain, and later infect the young shoot. The disease can be controlled by destroying these spores. This is effected by efficient pickling with either dry copper powder (2 oz. per bushel), formalin (1 lb. in 45 gallons of water for 3 minutes), or bluestone ($1\frac{1}{4}$ lb. in 10 gallons water for 3 minutes).

Seeds of the fungus causing this disease blow about at flowering time and may enter healthy flowers. When so infected the grain is formed in the usual manner and the fungus is enclosed with it. In consequence of the seed being infected internally (and not externally as with ball smut) this disease cannot be controlled by pickling. The only practical control is care in selection of seed, which should not be taken from a badly-infected paddock.

Flag Smut or Black Rust.

This appears as black parallel lines on stem and flag. The latter becomes curled and twisted, and the plant usually does not form a head. The black material is really a mass of spores or seeds of the disease. The diseased flag breaks up and the spores enter the soil. Later on these germinate and attack any wheat seedlings present. It is necessary, therefore, that these spores be destroyed before the next wheat crop is put in. A good burn cleans up most of the diseased stubble. The working of the fallow encourages the germination of spores in the soil and, having no wheat plants on which to live, they die. The growing of a crop of oats will tend to starve out this disease, since oats are immune to flag smut.

Take-all.

Take-all is similar to flag smut in that its spores are distributed through the soil. These may germinate and infect the wheat plant at the base of the stem. The roots become short and swollen. In some

cases the plants die out and bare patches appear in the crop; in others the plant persists but the grain fails to develop, and dead-heads appear.

Frequent cropping with wheat encourages take-all. Experience has shown that the following measures tend to keep it down:—(1) Burning the wheaten stubble; (2) using oats as a rotation, as the oat plant is immune to take-all of wheat; and (3) early and well-worked fallowing. Dry and also deep working of the fallow usually encourages the disease; the fallows should be kept free from barley grass, as take-all can live on this plant.

The Fallows.

The preparation that can be given a fallow naturally depends on the facilities at the disposal of the settler and on the amount and distribution of the rainfall. In this respect the past season presented various difficulties. Several farmers who did not get an early start with their winter fallowing, or who had a large area to break up, were caught by the dry conditions in August and early September, and had to leave the fallowing till after the October rains. Others who took advantage of the favorable conditions for summer fallowing (due to the abundant rains early in the year) found that, through lack of sheep, &c., they were unable to cope with the rapid growth of rubbish, and it became necessary in several cases to disc deeply in winter, and, in some instances, to repeat this operation.

Again, some of the entries were on new ground. The result was that, at the time of judging, there was a wide range in the quality of the exhibits, many of which were in rough condition with an abundance of weeds.

The evidence obtained from the cultivation trials at Carwarp should serve as a guide in preparing fallow in the newer Mallee. In these experiments various methods of cultivation have been employed, and the following average returns have been obtained over the past four years:—

	Bushels per Acre.
Summer fallow (worked in standard manner*) ...	11.7
Winter fallow (worked in standard manner*) ...	11.7
Late fallow (October)	9.4
Winter fallow (dry working)	9.2
Winter fallow (neglected)	7.5
Non-fallow	5.1

*Standard working comprised ploughing to a depth of 3½ inches, and the fallows spring-toothed and harrowed as required after rain to maintain a mulch 2½ inches deep.

These results again bear out the superiority of early as against late fallowing, and of carefully worked fallow as compared with one that was neglected or worked dry.

The peculiar nature of the 1928 season was responsible for some Mallee farmers obtaining a lower return from their better quality fallow than from land prepared in a less careful manner. Despite this, it is

unlikely that these farmers will depart from the use of the thorough methods of fallowing that have stood the test of experience and experiment over a number of years.

The awards in the various sections are as follow:—

Zone 5.—Competition for Royal Agricultural Society's Trophy.

100 ACRES FALLOW 1928, AND CROP 1929.

Points for Fallow 1928.

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total Points.
Possible Points	**25.**	**25.**	**25.**	**25.**	**100.**
R. Hynam	25	24	22	22	93
H. Peters	23	23	24	21	91
M. U. Walsh	24	22	22	21	89
E. MacLean	25	21	23	19	88
C. Ingwersen	23	22	23	19	87
A. Jackson	22	22½	22	20½	87
C. Loxton	23	22	22	20	87
A. Brydson	23	22	22	19	86
W. Hynam	22	21	23	19	85
L. Stacey	22	20	22	19	83
J. W. Lyons	21	22	20	19	82
L. G. Stewart	22	22	18	19	81
D. Maloney	20	20	21	18	79
A. M. Shaw	23	19	19	18	79
R. Thomson	20	20	21	18	79
N. Tozer	22	20	17	19	78
W. A. Darley	21	20	19	17	77
O. Hulland	24	18	19	16	77
C. Maginness	22	19	19	16	76

Of the nineteen fallows inspected in this zone competition it was noteworthy that seven entries were submitted from Baring, a district that has been opened only some four or five years.

Mr. R. Hynam (Patchewollock) obtained first place with 93 points. The paddock was a pine and heavy mallee flat that had been ploughed (wet) from stubble to 3½ inches in July, and cultivated after rain early in October with the combine. The area had been worked to an even depth and displayed excellent moisture and a good mulch. Points were lost on consolidation and for the presence of weeds.

Mr. H. Peters (Patchewollock) exhibited an area of summer fallow that was awarded second with 91 points. The land had been "out" for a year, and was scarified at the end of January, then harrowed, cross-scarified in July and harrowed, then scarified in October.

Mr. M. U. Walsh (Baring) came third with 89 points for an area of summer fallow, mostly pine sand. It had been ploughed with the mouldboard in February, then harrowed, undercut in July, scarified in August and harrowed, then scarified in October.

Fertilizer Cup—100 Acres Fallow 1927, and Crop 1928.

Conducted by the South-Western Mallee District B.F.A.

Competitor.	Variety.	Yield.	Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Crop Total.	*Fallow Total.	Grand Total.
Maximum Points ..	.. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
J. W. Lyons ..	Federation, Rance, Free Gallipoli	35	17	13	14	14	93	95½	188½
C. Maginness ..	Free Gallipoli ..	30	18	13	13	14	88	94½	182½
J. B. Carter ..	Federation	30	17	14	11	12	84	94	178
C. Ingwersen ..	Free Gallipoli ..	26	18	14	13	14	85	93	178
M. U. Walsh ..	Free Gallipoli ..	24	18	14	14	14	84	94	178
R. Thomson ..	Federation	28	15	11	10	13	77	95	172
A. Jackson ..	Free Gallipoli, Joffre, Nizam	22	18	14	13	11	78	93½	171½
E. MacLean ..	Warden, Currawa ..	20	17	13	14	11	75	92	167
G. H. Bugge ..	Federation	20	17	10	13	10	70	94	164
R. Hynam ..	Federation, Nizam ..	15	18	12	14	12	71	92	163
D. Moloney ..	Federation	17	15	13	12	10	67	93	160
W. Smith ..	Federation	15	17	13	12	10	67	93	160
W. Scholz ..	Huf's Imperial ..	22	14	9	9	13	67	92½	159½
O. Hulland ..	Nizam, Federation ..	15	15	11	12	9	62	93½	155½
P. Lynch ..	.. .. ..	17	14	10	9	12	62	92	154
H. Peters ..	Federation ..	13	15	12	12	9	61	93	154

* Points for 1927 fallow, as awarded by Mr. G. C. Coutts.

Mr. J. W. Lyons, Patchewollock, exhibited a splendid crop that stood out from the remaining fifteen entries, and gained first place with 93 points. It was well filled and fairly even, and at the time of judging promised the highest yield. It contained little disease, but was penalized for the presence of strangers and weeds. It had been sown on 15th-25th May with 75 lb. of seed pickled with formalin and 1 cwt. of super. per acre on well-worked fallow that had been ploughed in June-July, combined twice before harvest and again in February and March.

The fallow had been awarded 95½ points, and the aggregate for the 100 acres of fallow and crop gave Mr. Lyons first place with 188½ points.

Mr. C. Maginness's (Baring) crop of Free Gallipoli came second with 88 points, and gave the entry second place in the aggregate with 182½ points. The paddock was sown to oats for three years in succession, then fallowed and sown to wheat early in May with 55-60 lb. of formalin-pickled seed and 60 lb. of super. per acre. Points were lost for a few wild oats, a little disease, and an odd stranger.

Mr. C. Ingwersen (Baring) gained third place with 85 points with his crop of Free Gallipoli, and shared third place in the aggregate with Mr. J. B. Carter (Patchewollock), whose crop obtained 84 points.

DENNYS-LASCELLES CUP—75 ACRES FALLOW 1927, AND CROP 1928.
Conducted by the Patchewollock Branch, B.F.A.

Competitor.	Variety.	Yield.	Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Crop Total, 1928	*Fallow 1927.	Grand Total.
Maximum Points ..	.. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
J. W. Lyons ..	Federation, Rance, Free Gallipoli	35	17	13	14	14	93	87	180
J. B. Carter ..	Federation	30	17	14	11	12	84	87	171
A. Jackson ..	Free Gallipoli ..	20	19	14	13	10	76	88	164
W. Hynam ..	Sepoy, Nabawa ..	20	17	11	13	13	74	87	161
R. Thomson ..	Federation	27	15	11	9	13	75	86	161
R. Hynam ..	Federation, Nizam ..	15	18	12	14	12	71	89	160
W. Scholz ..	Huf's Imperial ..	22	14	9	9	13	67	90	157
G. H. Bugge ..	Federation	20	17	10	13	10	70	86	156
A. Brydson ..	Sepoy	17	17	12	11	13	70	85	155
A. Price	Currawa	17	16	12	13	13	71	84	155
D. Moloney ..	Federation	17	15	13	12	10	67	87	154
W. Smith ..	Federation	15	17	13	12	10	67	86	153
L. Stacey ..	Rajah, Bald Early ..	15	17	9	12	13	66	84	150
P. Lynch ..	.. .. ..	17	14	10	9	12	62	87	149
H. Peters ..	Federation	13	15	12	12	9	61	87	148

* Points for 1927 fallow, as awarded by Mr. M. Giles.

Fifteen entries were received for this competition. Mr. J. W. Lyons's exhibit consisted of 75 acres of the 100 acres of crop that was successful in the Fertilizer Cup Competition. The entry gained 93 points in this section, and placed the aggregate first with 180 points.

Mr. J. B. Carter's crop obtained 84 points, and the aggregate came second with 171 points. It had been sown at the end of April with 60 lb. of dry-pickled seed and 100 lb. of super. per acre. Flag smut was fairly prevalent, and an odd dead-head was seen. Compared with the winning entry extra points were also lost for yield and unevenness.

Mr. A. Jackson came third in the aggregate with 164 points.

In the competition for the best 75 acres of fallow, 1928, and crop on that fallow, 1929 (Dennys-Lascelles Cup), thirteen entries were submitted. The awards for 1928 are as follow:—

DENNYS-LASCELLES CUP—75 ACRES FALLOW 1928, AND CROP 1929.
Conducted by the Patchewollock Branch, Better Farming Association.

Competitor.	Moisture.	Mulch.	Cultivation.	Absence of Weeds.	Total.
Maximum points	**25**	**25**	**25**	**25**	**100**
R. Hynam	25	24	22	22	93
H. Peters	23	23	24	21	91
A. Jackson	23	23	22	21	89
A. Brydson	24	22	22	20	88
C. Loxton	23	22	22	20	87
W. Scholz	25	23	19	19	86
W. Hynam	22	21	23	19	85
J. W. Lyons	21	22	20½	19½	83
L. Stacey	22	20	22	19	83

Dennys-Lascelles Cup—75 Acres Fallow 1928, and Crop 1929—*continued.*

Competitor.	Moisture.	Mulch.	Cultivation.	Absence of Weeds.	Total.
Maximum points	**25**	**25**	**25**	**25**	**100**
D. Moloney	20	20	21	18	79
A. M. Shaw	23	19	19	18	79
R. Thomson	20	20	21	18	79
N. Tozer	22	20	17	19	78

Mr. R. Hynam's fallow led with 93 points. It comprised 75 acres of the 100 acres entry that gained highest points in the Zone competition, and has been commented on thereunder.

Mr. H. Peters entered portion of his 100-acre exhibit and again came second with 91 points.

Mr. A. Jackson's entry was next with 89 points. Most of the area had been ploughed from oaten stubble, with the mouldboard, at the end of July, and harrowed and combined in October.

Of the eight crops inspected in the local competition, conducted by the Baring Branch of the Better Farming Association, Mr. C. Ingwersen's entry of Free Gallipoli was awarded 94 points. It was nicely filled, not tipped and fairly even, and gave promise of the highest yield. A few strangers and some flag smut were noticed. This crop had been sown early in June, on well-worked fallow, with 60 lb. of formalin-pickled seed and 100 lb. of super. per acre. The aggregate for the fallow and crop placed Mr. Ingwersen first with 176 points.

Awards—Fertilizer Cup—Baring Local Competition.
50 *Acres of Fallow* 1927, *and Crop* 1928.

Competitor.	Variety.	Yield.	Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Crop Total.	*Fallow Total.	Grand Total.
Maximum Points ..	.. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
C. Ingwersen ..	Free Gallipoli ..	35	18	14	13	14	94	82	176
M. U. Walsh ..	Free Gallipoli ..	32	18	14	14	14	92	83	175
E. MacLean ..	Warden, Currawa ..	25	17	13	14	11	80	80	160
E. Talbot ..	Currawa, Free Gallipoli	27	17	13	12	13	82	78	160
W. A. Darley ..	Federation	22	14	13	13	11	73	79	152
C. Hulland ..	Nizam	19	18	11	12	9	69	81	150
C. Maginness ..	Krithia	16	17	10	13	9	65	78	143
N. E. Jamieson ..	Federation	12	14	9	14	9	58	75	133

* Points for fallow 1927, as awarded by Mr. M. Giles.

Mr. Walsh also submitted a crop of Free Gallipoli which, at the time of judging, was not expected to finish as well as the winning crop, otherwise little separated these two exhibits. This entry had been sown from the second week in June with 70 lb. of dry-pickled seed and 90 lb. of super. per acre.

In the aggregate Mr. Walsh came a close second with 175 points.

Mr. Talbot's entry was awarded third in the crop section with 82 points, and shared third place in the aggregate with Mr. MacLean.

TRADE WITH THE EAST.

POSSIBILITIES OF DEVELOPMENT.

By R. Crowe, Exports Superintendent.

Tourists and local residents, impressed by the huge population of Eastern countries, frequently direct attention to the immense trade that they suppose is only waiting to be tapped.

At various times during the last thirty-five years delegations have been sent from Australia to Eastern countries with a view to opening up trade. Our last official representative was Mr. E. T. Sheaf, who was Trade Commissioner in the East up till about four years ago. In one of his reports, he quotes an illustration of the magnitude of Eastern populations given by a writer on India, who said: "If the population of India were divided into lots of 100,000 each, and a traveller set out to pay a visit of one week's duration to each group, allowing no time for moving from one place to another, it would take him 60 years to complete his task."

As there is about one-third of the population of the East in India, it would, at the same rate, take 180 years to similarly visit the whole of the Eastern countries.

The traveller, to do any good, would require to be a remarkable linguist, as there are at least 300 languages spoken in the Orient. Indeed, it is said that the daily business of the Bombay bazaars is conducted in 40 languages.

As to distances, approximately 30 days would be required for travelling from one extreme to the other. Six days would be spent in travelling from Singapore to Calcutta, Madras, or Hong Kong, and ten days to Shanghai. Steamers of quite considerable tonnage penetrate the interior of China by way of the Yangtsze-Kiang for a distance of 1,500 miles. Most of the population of China could not be reached with our goods or products by either steamer or railways, and the same holds good with regard to India and other countries. It will be seen, therefore, that the great majority of the Eastern peoples are quite beyond our reach for trading purposes.

The population of the principal cities at ports and those which may be reached by rail or river in Eastern countries does not exceed 15,000,000. By including the smaller towns on the seaboard and railways, the total number might be shown at 50,000,000.

However, all calculations regarding the possibilities of trade, based on the population, without taking into consideration economic conditions, would be misleading. The greater number of the citizens could not afford to become consumers of products from Australia, even of the cheaper varieties, except on a very limited scale. To give some idea of the position in the most densely populated country of the East, viz., in Java, an island less than two-thirds the size of Victoria, with a population of over 40,000,000, Mr. Sheaf states that the accessible population is under 1,000,000, and included in this number are 63,192 Europeans.

Of course, trade with Eastern countries would not be confined to the European population resident there. The Chinese merchants are good customers, and, in addition to these, there are many wealthy natives in accessible centres who might become clients, if religious

grounds were not a bar, for it might happen that people of a certain religion or caste, embracing vast numbers, would be willing to take our flour, but could not be induced to buy Australian meat.

In Java, I have myself seen men and women carrying on their backs, long distances to market, bags of rice as large as our bags of wheat. I have also seen them carrying on their backs metal for mending roads, and on one occasion I saw a team of eight men, on a long country road, carrying on their shoulders a grand piano. This small country is comparatively well served by railways, and yet most of the people are beyond reach of travellers; further, most of them are able to purchase only the cheapest necessities.

When I was there, wages equalled fourpence per day; now they are about one shilling, out of which workers must keep themselves. Their chief diet is rice, and after paying for sufficient rice for a wife and family, there is but little left for what even the humblest Western people would consider essential.

The Australian trade with China is comparatively small. The yearly value of our exports there totals less than £500,000 sterling, whilst our imports from there exceed £750,000 sterling. Our chief exports to China are sandalwood from Western Australia, leather, wheat, butter, milk and cream, timber, jams, and jellies. We import from there oils, fats and waxes, drugs, fireworks, &c.

According to the latest figures, Japan buys from Australia goods to the yearly value of nearly £10,500,000. In this is included £8,000,000 for wool. Our wool trade with Japan has been of gradual growth; compared with four years ago there is an increase of nearly £2,000,000. She also takes wheat and flour to the value of £1,250,000. The balance of our Japanese exports consists mostly of tallow and metal.

The quantity of goods brought to Australia from Japan is increasing, and, according to the latest figures, their yearly value is set down as over £5,000,000; textiles and silk account for over £4,000,000 of this amount. It will therefore be seen that the value of our exports to Japan is about twice that of goods imported to Australia from there.

Unlike Japan, India sends us goods of approximately twice the value of those we send to her. Importations by the Commonwealth from India were worth £6,660,000; this amount is chiefly represented by £5,000,000 for bags. Our total yearly exports to India are worth about £3,500,000. They consist chiefly of gold and silver (worth £2,240,000), and wheat and timber.

From the Netherlands East Indies (Java being the principal island), we receive oils—that is petroleum spirit, kerosene, &c., tea, rubber, &c., to the value of £6,451,688, and they take from us goods worth £2,052,857. Half this sum is for flour and biscuits, and the other half for milk, bacon, butter, leather, &c. Apart from petroleum, the value of our imports from the Netherlands East Indies about equals the value of our exports there.

From this it will be seen that a considerable trade connexion with Eastern countries has already been established, and every effort is made by exporters in Australia to foster that trade. Any further development must be based on the same principles as have been adopted in the past, and be of gradual growth.

Butter was shipped to Eastern countries, particularly Java, from Melbourne over 30 years ago. When I was there, I noticed that Dutch,

Danish, and Swedish tinned butter was attractive on the grocers' shelves, as compared with Australian tinned butter. The tins from those countries were wrapped in paper and appropriately packed; whilst the Australian article was disfigured with rust marks due to finger prints, and the stains of brine, and particles of butter, as well as to unsuitable sawdust packing. Any sawdust which is moist or resinous, or from improperly seasoned timber is not suitable for packing tinned goods for any country where humid climatic conditions prevail, as in the tropics.

Most of the faulty packing methods have had the attention of exporters of Australian tinned butter, with the result that 98 per cent. of the butter imported by Java to-day is Australian butter, and of this, 92 per cent is shipped from Melbourne. Our total trade with the East in tinned butter now exceeds 3,000 tons a year. This is an achievement of which we may be justly proud.

Upon my return, I impressed upon exporters the necessity for packing biscuits as carefully as are similar products sent to the East by English and French manufacturers. I pointed out that every section or layer in each tin from French and English houses was wrapped in transparent paper, and that each biscuit rested on its edge, with the result that there were no broken buiscuits whatever. Further, the biscuits from France and England were graded according to colour; those from Australia were simply thrown into tins, and while their quality compared favorably with the product from other countries, the lack of uniformity in colour, and the large percentage of waste owing to the great number of broken biscuits, militated against their success on a foreign market. This state of affairs has, however, been materially improved.

Trade with the East differs from that of most other countries. The variation in seasons not being marked, merchants are not concerned about seasonal supplies. They will trade only for regular quantities, fortnightly or monthly, the year round, according to the shipping services, and if an exporter fails to maintain a continuous and regular supply, business connexions are severed, and great difficulty will be experienced in recovering the lost trade. Melbourne butter exporters understand this, and when there is a shortage, they get butter from another State, or from beyond the Commonwealth, to tide them over any temporary local shortage. This trade has been of gradual growth, and has been won by an article of good quality effectively and attractively packed, and offered at a reasonable price.

The uncertainty of regular supplies has been, and is still, a bar to the development of an export trade in meat to the East.

The difficulty of a regular supply, however, does not apply to, say, canned fruit, dried fruits, or jam, for all of which Australia would like an extended market? There should be no difficulty under the headings of quality, packages, or packing. It is evident, therefore, that price is the main obstacle. Merchants and consumers in the East are, after all, not unlike merchants and consumers here or elsewhere. They can be induced to take a new article only if it is as good in every respect as that they have already been accustomed to, and if it can be offered at a slightly lower price—at any rate, to commence with. When once goods have been thus introduced, the development of a trade depends on the merits of the products.

I hope that I have given some idea of the extent and nature of the trade to be done between Australia and Eastern countries, and the manner in which that trade has to be catered for. The possibilities, although very extensive, are not to be based on the total population in those countries, and we can look to create a demand for goods only if we can deliver regular and first class supplies put up in a careful and attractive manner.

THE COMPOSITION OF MINERAL LICKS.

By W. R. Jewell, M.Sc., Agricultural Research Chemist.

Until comparatively recent times, the chemical study of rations and of animal nutrition was concerned almost solely with organic compounds such as proteins, fats and carbohydrates. In computing standard rations, and in studying animal metabolism, these organic compounds were considered, and practically no attention was paid to the nature and amount of mineral matter invariably present in all feeding stuffs. Since the beginning of this century, however, the function of inorganic salts has received an increasing amount of study, and, although all the attendant problems have not yet been solved, the vital importance of mineral matter in animal nutrition is now fully recognized by scientific workers. The increasing use of stock licks in this State and elsewhere would indicate that, generally speaking, the farming community is also aware of this fact. It is proposed in this article to indicate briefly the nature of the mineral matter that enters into the question of animal nutrition; the respective effects on the animal of deficiencies of different elements; which elements are likely to be deficient in ordinary rations, and, finally, how these deficiencies may best be remedied.

Mineral Elements Present in the Body.

All living matter consists mainly of water, with from 10 to 20 per cent. of organic matter and a small proportion of inorganic salts, generally termed "mineral matter." This "mineral matter" includes calcium, phosphorus, magnesium, potassium, sodium, iron, sulphur and chlorine in appreciable amounts, and, in addition, traces of such elements as iodine, manganese, copper, &c., the importance of which, even in such small traces, is only now being fully recognized. The presence of all these elements is essential to normal growth, and each has its own particular function to perform.

Functions of Mineral Elements.

Mineral elements are necessary:—

(1) for the formation of new tissue in the growing animal;
(2) to make good losses in excreta and milk;
(3) in the processes of digestion;
(4) to keep the blood in a normal and healthy condition;
(5) to ensure a proper osmotic pressure in the living cells, and hence a healthy life.

Obviously, if any of the foregoing functions are prohibited or made irregular, normal growth and life cannot occur. Further, not only must these minerals be present, but a correct balance of the various elements is also essential, and if one particular element is not present in the right amount, disorder or illhealth may result. Although there is a continual loss of mineral matter in excreta, the necessary balance is generally maintained by the body, certain parts of which hold reserve supplies which may be utilized when occasion demands; for example, the bones act as a reservoir for calcium or phosphorus, and supply these two elements to the body in cases of acute calcium or phosphorus deficiency. It is obvious that these reserve supplies cannot be drawn on indefinitely without trouble ensuing.

Stock breeders have developed what might be termed "unnatural" animals, that is, animals which grow to marketable size at an abnormal rate, or which yield an abnormal amount of produce, such as cows with high milk yields, and hens laying 300 or more eggs per year. This extra amount of produce means a drain of mineral matter from the animal, and in recent years the effects of mineral deficiency have become more pronounced.

Mineral deficiency may produce a particular irregularity, or it may be reflected simply in retarded growth and general malnutrition; and it has been shown in numerous instances that such malnutrition creates an increased susceptibility to disease. Further, a deficiency in mineral matter may result in lowered milk yields from cows, inferior fleeces from sheep, decrease in eggs from hens, and, generally, in increased mortality of the young.

Apart from these general results of mineral deficiency, specific irregularities may occur as indicated in the following examples:—

(*a*) Calcium or phosphorus deficiency may result in rickets. In cows, calcium deficiency may give rise to dead or weakly calves, while a deficiency of phosphorus may result in the disease known as Botulism.

(*b*) Iron deficiency may result in primary anaemia or, as in certain parts of New Zealand, in a peculiar disease called Bush Sickness.

(*c*) A deficiency of iodine may cause goitre. In addition, iodine increases the assimilation of calcium, phosphorus and fats, is necessary for physical development, and has an influence on the growth of hair or wool.

(*d*) If the supply of all elements is stopped, death occurs more quickly than as the result of ordinary starvation.

(*e*) A deficiency of one element may interfere with the assimilation of another, and thus the proportion of one element compared with that of another is very important.

Further examples could be given, but it will be clear from the foregoing that mineral deficiency may cause very serious general or specific disorders. When these ailments are due solely to a deficiency of minerals they may be prevented or cured by adjusting the mineral diet to correct the deficiencies, and it is for this reason that mineral licks are now so largely used.

Elements Likely to be Deficient.

In Victoria, phosphorus is undoubtedly the element most likely to be seriously deficient. It can be accepted as a fact that there is a general phosphorus deficiency throughout Victorian soils, with a corresponding deficiency of this element in feeding stuffs grown thereon. Common salt is another inorganic salt which must be supplemented by inclusion in any mineral lick. Calcium is often deficient, as is iodine, the latter being pronouncedly deficient in certain isolated districts. Iron, magnesium, sulphur and manganese are other elements which are likely to be in insufficient quantity in ordinary rations. With salt as a basis, we may take it that phosphorus, calcium, iodine, iron, magnesium, sulphur and manganese are the elements most likely to be required in a supplementary mineral ration. How, then, may these elements best be supplied, and in what quantities?

Ingredients of Mineral Licks.

It is far from easy to decide upon all the necessary components of a mineral lick, and as yet the making of licks has not been placed on a scientific basis. In the first place, we should know the requirements of each animal for each particular element. This should be followed by a knowledge of the amounts of these minerals present in the ordinary ration. These two sets of facts would indicate the nature and extent of the deficiencies from which, knowing the influence of any additions on other elements present, it should be possible to calculate a scientifically correct mineral ration. Obviously, this necessary data is not yet available, and the composition of a mineral lick for each type of animal in each district cannot be accurately ascertained. The best that can be done at present is to prescribe a mixture containing adequate amounts of elements known to be actually deficient, and sufficient but not harmful amounts of other elements likely to be wanting. In this way we may devise a general purpose or standard lick most likely to be generally satisfactory in all districts, admitting the many disadvantages of the indiscriminate use of such a standard mixture, but believing it can serve a useful purpose until such time as more detailed information is available. The value of such mixtures can, of course, be demonstrated by feeding trials.

Form in which to Supply Minerals.

Phosphorus and calcium usually are supplied together as calcium phosphate in one form or another. Sterilized bone meal has been largely used for this purpose, and, if sterile, is highly satisfactory. However, it is becoming increasingly difficult to obtain, and another form of phosphate is desirable. Ground rock phosphate is now generally used, and is quite efficient as a source of calcium and phosphorus, provided it does not contain appreciable amounts of flouride, which is harmful to stock. Nauru and Ocean Island phosphates, which constitute the bulk of rock phosphate used in Victoria, contain only very small amounts of flouride, and for that reason are satisfactory. Superphosphate should not be used, as it may produce internal disorders, such as gastritis, in stock. We may take it, therefore, that either

ground phosphate or sterilized bonemeal is the most economical and efficient form of supplying calcium and phosphoric acid to stock. Extra lime, as limestone or slaked lime, is rarely necessary, and in any case should be added with discretion, as an excess of lime acts deleteriously in rendering some of the phosphoric acid unavailable to stock.

Magnesium is added as Epsom salts, magnesium sulphate, which also has a tonic action on stock. Iron may be added as ferric oxide, but it is more usual to use sulphate of iron (ferrous sulphate). Iodine is always present as iodide of potassium, an expensive ingredient, but one used only in very small proportions. If manganese is required, sulphate of manganese (manganous sulphate) in the best form. Free sulphur is an ingredient common to most mineral licks. Some of it is absorbed by the animal and some is excreted and helpful in keeping away flies.

Suggested Mixture.

Probably as satisfactory a mixture as can be determined at present for a general purpose stock lick is one compounded as follows:—

Mix together thoroughly—

1 bag (187 lb.) salt,
⅓ bag (62 lb.) ground phosphate; or ½ bag (93 lb.) sterilized bone meal,
14 lb. sulphur,
9 lb. sulphate of iron,
7 lb. of Epsom salts.

Dissolve in water 4 oz. potassium iodide and 4 oz. maganese sulphate, and spray this over the mixture, making sure that the solution is incorporated with every part of the mixture and the whole thoroughly mixed. The lick may be added to ordinary rations, or may be put in sheltered troughs in the paddock for stock to take as required.

The foregoing gives 280 lb. of a well-balanced lick at a cost of about 18s. 6d. for materials, or about £7 15s. per ton (at Melbourne). Of course, satisfactory licks can be obtained ready mixed, but they should be purchased with discretion.

For most of the information regarding the effects of mineral deficiencies on stock, the writer is indebted to some notes on the work of the Rowett Institute, Scotland, compiled by Mr. A. W. Turner, of the Melbourne University Veterinary School.

APRICOT SCAB OR SHOT HOLE.*

A Synopsis of Three Years' Work on Control Conducted in the Goulburn Valley.

By S. Fish, M.Agr.Sc., Plant Research Laboratory, Department of Agriculture.

Apricot scab or shot hole is a widespread disease in Victoria. It affects the twigs, leaves, buds, and fruit. The affected fruit is unfit for marketing in a fresh state, and is quite unsuitable for canning. The disease has become so general in the Goulburn Valley irrigation area that many growers are finding the industry unprofitable.

The fungus causing apricot scab produces small brown spots on the leaves. Later the diseased areas drop out from the leaves leaving the characteristic shot hole effect. The disease appears on the fruit as a minute crimson spot which increases in size, and after a time the spot becomes brown in colour, and a scabby effect develops. The disease is noticed on the fruit usually about October, particularly after a period of wet or humid weather. On young wood the affected portions appear as depressed oval areas, the bark ruptures, clusters of spores develop, and gum often exudes.

Under conditions favorable for its infection and development, the fungus will even kill the buds, and such conditions may occur during autumn, winter, and spring. These dead black shiny buds between the bud scales hold spores capable of infecting leaves and fruit. The continued activity of the fungus during the winter, when it attacks the dormant buds, suggests a reason for the experimental spray treatments adopted. Actually, for the most part, sprays of different strengths were applied at two different periods, firstly, during the trees' dormancy, either during autumn or winter, and again during the early spring at the pink-bud stage, i.e., the early bud swell stage at which the pink sepals are exposed; also in some instances after the fruit had formed.

Experimental Work during 1926.

Thirteen-year-old Moorpark trees on seedling stocks were used throughout the work. The 1926 experiments consisted of spraying with Bordeaux mixture and lime sulphur of varying strengths at the dormant period, at the pink-bud stage, and after the fruit had formed. Each treatment was tested on a row of six trees.

Results.

On unsprayed trees 12 per cent. of the fruit was diseased. Where Bordeaux mixture 6.4.40 and lime casein spreader were applied at the dormant and again at the pink-bud stage, the quantity of diseased fruit was 3 per cent.

Where an additional Bordeaux spray of 6.4.80 was applied after the fruit had formed, only 1 per cent. was found to be diseased, but 16 per cent. was blemished by the spray. This blemish occurs as a crimson skin blush on the western side of the fruit.

* *Clasterosporium carpophilum* (Lév) Aderh (*Coryncum beijerinckii* (Oud)).

The Bordeaux mixture 6.4.40, plus lime casein spreader, was made up as follows:—12 lb. bluestone was dissolved in 40 gallons of water; 8 lb. of quicklime was slaked slowly, and then added to 40 gallons of water, and the two lots of 40 gallons were poured simultaneously into the vat. A sky-blue-coloured Bordeaux mixture resulted, which did not give a brown precipitate with potassium ferrocyanide solution. The spreader was made up into a fine paste, and added to the spray mixture at the rate of 1 lb. per 100 gallons of spray.

Where lime sulphur (20-25 per cent. soluble sulphur) 1-15 was applied at the dormant, and 1-25 at the pink-bud stage, 29 per cent. of scabby fruit occurred. Where an additional spray of lime sulphur 1-40 was given, after the fruit had formed, 30 per cent. fell, and of the remaining 70 per cent. there was 57 per cent. of clean fruit, and 43 per cent. that had been blemished by the spray. The ripening of the fruit remaining on the trees was delayed ten days, and even then this fruit was under size. Leaf injury also occurred.

Experimental Work during 1927.

The object of the work for 1927 was to ascertain the value of Bordeaux mixture 6.4.40, plus 1 lb. of lime casein spreader per 100 gallons of spray, when applied at various intervals from late autumn to the pink-bud stage in early spring, i.e., during—

Autumn, before the leaves had fallen (19th May).
Winter, after the leaves had fallen (20th July).
Pink-bud stage (15th August).
Autumn, and again at the pink-bud stage.
Winter, and again at the pink-bud stage.

Unsprayed trees for one year and two years were included as controls.

For this purpose 108 fourteen-year-old trees were divided into 36 units of three trees each, and the various treatments were replicated in different parts of the block. Each unit was harvested completely and the number of scabby and clean fruits counted.

Results.

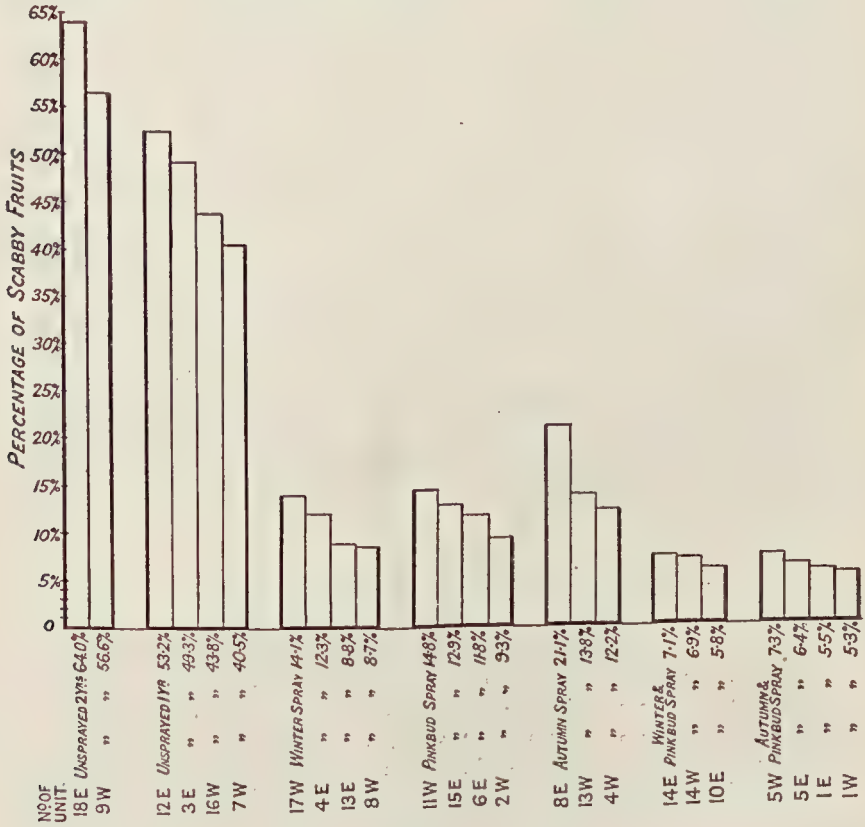
Graph No. 1 shows the 1927 results from the unsprayed trees, and from all the sprayed units, other than those in immediate proximity, whether north, south, east, or west, to the units of unsprayed trees. The results obtained from units in the immediate neighbourhood have been omitted; this has been done for the reason that these units, whatever their treatment, were uniformly more heavily infected than those situated at some distance from the unsprayed trees. It is reasonable to suppose that, having regard to the nature of the disease, proximity to unsprayed trees constitutes a serious source of infection to which the unprotected foliage and fruit of the sprayed trees are exposed. The foliage and fruit of sprayed trees are not protected, because they develop subsequent to the pink-bud-stage spray.

During 1927, circumstances were such that the winter-sprayed units were all in close proximity to the unsprayed trees. A re-arrangement was made for the experiments of the following year. The 1927 results from these units are indicated in graph No. 1. This work showed that Bordeaux mixture 6.4.40, plus 1 lb. of lime casein spreader per 100

gallons of spray, applied in the autumn and again at the pink-bud stage, reduced the percentage of scab in a year favorable to its development from 46.7 per cent. in unsprayed trees to 6.1 per cent.

Experimental Work 1928.

In 1928, the work was continued along the same lines as in 1927. Similar sprays were used, and were applied at about the same periods. It was necessary to increase the number of units in order to obtain new units of trees unsprayed for one year, and also winter-sprayed units, away from the immediate proximity of the unsprayed trees. The three



Graph No. 1.

Showing the results obtained in 1927 from Bordeaux mixture 6.4.40, plus 1 lb. of lime casein spreader per 100 gallons of spray, applied at the stages indicated.

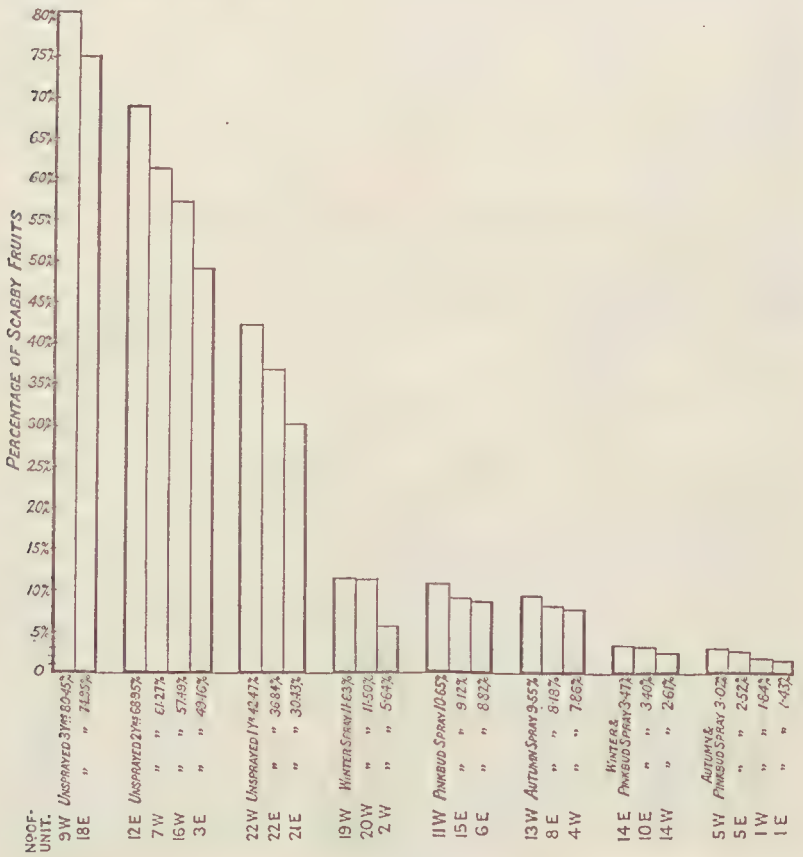
new winter units, as shown in graph No. 2, had received a pink-bud spray in the previous year. All other units had received similar spraying in 1927 to that given in 1928.

At picking time, each unit was completely harvested, and the clean and scabby fruit counted. The fruits examined for the obtaining of the 1928 results numbered over 300,000.

Results.

Graph No. 2 shows the results obtained in 1928. Here again no note was taken of results on sprayed units in the immediate proximity, either north, south, east, or west of unsprayed units. As before, all other sprayed units are included in the graph of the results.

From this work, it can be seen that Bordeaux mixture 6.4.40, plus 1 lb. of lime casein spreader per 100 gallons of spray, applied in the autumn, and again at the pink-bud stage, has reduced the percentage of scab in years very favorable for its development from 36.5 per cent. to 2.2 per cent. in 1928.



Graph No. 2.

Showing the results obtained in 1928 from Bordeaux mixture 6.4.40, plus 1 lb. lime casein spreader per 100 gallons of spray, at the stages indicated.

The cost of giving one tree two sprayings with Bordeaux mixture and the necessary spreader was sevenpence. In arriving at this amount, allowance was made for the cost of the spray material, labour, use of a horse, and interest and depreciation on the outlay for the pump. Five vats of spray were used per day. The apricot trees under test were given 2 gallons of spray per tree.

It was found that there was no diminution in the yield of the trees that received the treatment outlined above during 1927 and 1928. The average yield per unit in 1928 of the trees that were unsprayed for two years was 5,326 fruits, whereas the average yield per unit of the trees that received the autumn and pink-bud stage sprays for two years was 6,181 fruits.

SUMMARY.

(1) Thorough spraying in the autumn (as the final leaves were falling) with Bordeaux mixture 6.4.40, to which was added a lime casein spreader at the rate of 1 lb. for every hundred gallons of spray, followed by a similar spraying when the trees were at the pink-bud stage, very greatly reduced the percentage of scab. In 1927, the quantity of scabby fruit on unsprayed trees was 46.7 per cent.; on sprayed trees it was only 6.1 per cent. In 1928, the percentage of scabby fruit on unsprayed trees was 36.5 per cent., while on the sprayed trees it was only 2.2 per cent.

(2) On trees unsprayed for three years 77.7 per cent. of the yield was affected with scab as compared with 2.3 per cent. on trees sprayed with Bordeaux mixture in the autumn, and at the pink-bud stage in early spring.

(3) The total cost of the treatment was sevenpence per tree.

(4) The spraying during autumn, and again at the pink-bud stage, did not produce spray blemish or depress the yield.

Opportunity is taken to thank Mr. W. Gilchrist, manager of the High School Farm, Shepparton, for the use of the apricot trees, and for giving all possible assistance in the carrying out of practical work in connexion with the experiments; also to Messrs. Pilloud and Nunn, orchard supervisors, who assisted with the counting and examination of the fruits.

CANADA'S GRAIN CROPS, 1928.

In 1928 the wheat crop in Canada amounted to 533,571,000 bushels, being the first time that the half-million bushel mark has been passed. The previous record was in 1927, when the crop was 479,655,000 bushels. The average yield last year was 22.1 bushels per acre.

Oats yielded, in 1928, 452,153 bushels, and barley 136,391,400 bushels.

The aggregate value of all field crops is estimated at £220,113,600, and the total area sown to field crops was 59,351,811 acres.

ACTINOMYCOSIS.

(LUMPY JAW. WOODY TONGUE.)

By S. A. Mountjoy, B.V.Sc., Veterinary Officer.

This is an infectious stock disease, and every year in Victoria it is necessary to kill a large number of cattle suffering from it. In the Cattle Compensation Act, which provides for the payment of compensation on account of cattle suffering from certain diseases which are destroyed, actinomycosis is one of the diseases specified. Now and again pigs, horses, and sheep contract the disease, and human beings are not immune from it.

Cause.

Actinomycosis is caused by an organism known as the Ray Fungus, which exists in grasses and grain. It is strongly resistant to antiseptics, heat, and sunlight, and may remain alive in a dry state for years.

Mode of Infection.

When animals eat food containing the fungus, infection takes place through the mucous membrane, usually of the mouth. A possible point of entry is in the wound left by the shedding of temporary teeth, or infection may be caused by grass seeds, particularly the seeds of barley grass and spear grass; such seeds when eaten dry force their way through the mucous membrane of the tongue, mouth, or pharynx, and carry the infection into the deeper structures. For this reason the disease is usually more prevalent in districts where such grasses as those referred to abound. Infection of the udder occurs through the milk ducts.

Symptoms in Cattle.

The parts most frequently affected are the skin and glands of the head, throat, jaws, tongue, and udder. In actinomycosis of the lips there are to be found in the connective tissue of one or of both lips round or ovoid firm tumors, varying in size from that of a pea to that of a walnut. These tumors usually undergo softening in the centre, and may break externally. In some cases there may be a large amount of connective tissue in the region of the nodules, causing the lips to be quite firm and rigid.

Actinomycosis of the tongue, which may be suspected if salivation is noticed, often takes the form of firm nodules on the organ, or of an ulcer in the so-called food cavity. Later on, when the muscular tissue becomes affected to any great extent, the tongue will be forced out of the mouth and mastication will be interfered with, and inspection will reveal the presence of nodules or ulcers. In more advanced cases the organ is much enlarged, and almost wood-like to the touch, hence the name Woody Tongue.

Actinomycosis of the jaw bones is, as a rule, not noticed until the head shows more or less deformity. On either the upper or lower jaw bones a firm hard swelling develops due to an increase in the size of the bone. The swelling, which generally causes difficulty in chewing, spreads and increases in size, the overlying skin becomes thickened and

adherent to it, and eventually perforation takes place with the discharge of thick yellow pus. Granulations gather around the wound, very often forming a large cauliflower-like mass of raw tissue which bleeds easily.

Actinomycosis of the skin and glands of the head and throat is usually first noticed as a small insensitive and somewhat large swelling, from which a cord-like thickening extends into the depths of the tissues, situated behind the angle of the lower jaw, below the ear, on the cheek, or on the neck. This swelling gradually enlarges, becomes firmly united to the overlying skin, which it usually perforates, and discharges a thick creamy pus or pus-like mass.

The wound will very often heal, but later on another swelling will probably form in the vicinity, eventually discharging pus. In some cases the wound does not heal, and discharges slightly most of the time, and a mass of raw tissue forms which bleeds easily.

Actinomycosis of the udder usually manifests itself either in the form of hard swellings in the udder, in which there are a number of small nodules, or small nodules may be felt distributed through apparently normal udder tissue.

Treatment.

Superficial skin and gland lesions can be removed surgically, but this is possible only when the tumor is sharply circumscribed and surrounded by healthy tissue, and should be done only by a qualified veterinary surgeon.

When the abscess is "ripe," a cure can often be obtained by making a fairly large incision over the swelling to allow free drainage, and by painting the cavity with tincture of iodine daily.

In valuable animals where the soft tissues are affected, and surgical interference is not advisable, the internal administration of potassium iodine (one to five teaspoonsful daily) dissolved in water may be tried, but as this treatment may have to be continued for a considerable period, and there is a danger of the animal becoming affected with iodine poisoning, it should be carried out only under instructions from a veterinary surgeon.

Treatment of bone cases is not advisable.

Post-mortem Appearances.

Most of the conditions described can be seen without holding a post-mortem examination. The discharge from the actinomycotic lesion usually contains fungus colonies which are gritty to the touch, and, as a rule, yellowish in colour, and may be seen with the naked eye. The jaw bones are found to be enlarged and honeycombed. On opening the nodules in the udder they will be found to consist of a fibrous capsule enclosing a yellowish pus.

Means of Spread.

Cattle affected with a discharging actinomycotic lesion are a great source of infection. As already mentioned, the fungus is usually taken in with the food. Cattle suffering from the disease and with discharging sores should never be allowed access to paddocks wherein there are healthy stock, or to feeding sheds used by other cattle. Pastures which have become infected with the fungus should be thoroughly cultivated or burned.

Actinomycosis is a notifiable disease, and all cases should be at once reported to the Chief Veterinary Inspector.

TUBERCULOSIS IN STOCK.

By W. N. Lerew, G.M.V.C., Veterinary Officer.

Definition.

Tuberculosis, or consumption as it is generally termed when it affects the lungs of man, is a common disease among some of the lower animals, especially cattle and pigs. It is the most widely-spread stock disease known, and under conditions favoring it, may affect every animal in a herd. It is communicable from cattle to man. In such cases infection usually takes place by the use of milk of diseased cows. Pigs are also very liable to the disease, if fed on the raw milk or on the carcasses of tubercular animals. Birds may also contract the disease, though mammalian tuberculosis is not transmissible to birds.

Cause.

The *bacillus tuberculosis*, the causal organism of the disease, was first demonstrated by Koch in 1882. It is of very great vitality, and if conditions are favorable, the bacillus will retain its virulence for months, but if exposed to direct full sunlight, it dies in a few hours. In a moist heat of 140° F. it will succumb in an hour and at 180° F. it will be killed in fifteen minutes.

Contributory Causes.

Although, of course, the tubercle bacillus must be present in order that the disease may exist, several outside influences contribute largely to the spread and virulence of an outbreak. Amongst them may be mentioned insanitary surroundings, overcrowding, insufficient nourishment, heavy milking, in-breeding, and breeding from stock that are too young. These conditions all tend to decrease bodily health, and to lower an animal's resistance. The state under which the germ flourishes is provided in dark, damp, badly ventilated sheds.

Tuberculosis is very prevalent in herds running on rich heavy flats, where the ground has a high moisture content. It is, however, comparatively rare in hill country, and in the drier northern portions of the State.

Congenital tuberculosis is almost unknown. It is not until the germ is implanted, and conditions favour its development, that the disease begins.

Progress of the Disease.

In stock, progress is slow and insidious. The disease may be present for a long period before its presence is even suspected, and it may actually spread through the whole herd unless proper precautions are taken to check it.

Practically any organ of the body may become affected, but a greater proportion of cases occur in the intestinal glands, or in the lungs, and the glands in the chest. Other common seats of the disease are the glands round the throat, those in front of the shoulder and stifle, and the glands above the back of the udder, also the udder itself.

The characteristic lesion is a small rounded nodule which unites with other nodules to form conglomerate masses of all sizes up to 12 inches in diameter. When these tubercles, as they are called, are cut into, the contents will be found to vary from a creamy pus to a dense firm mass resembling soft ripe cheese. This latter condition is termed caseation. In advanced or chronic cases the tubercle may be hard and gritty, due to deposits of lime salts. This is referred to as calcification. In the lungs—the most common seat of infection—the tubercles may often occur in clusters, and the covering of the lungs and the lining of the chest walls become coated with fringes of false membranes containing tubercles which increase to form pale red cauliflower-like growths. These are often spoken of as "grapes."

Symptoms.

If the infection is in the lungs (Pulmonary Tuberculosis), the first sign of illness will be a cough which will be greatly aggravated by any exertion. Wasting then commences, the skin becomes harsh and dry, and the old hair is not shed as soon as it should be. Gradually the animal grows thinner and weaker till death occurs.

If the abdominal organs are affected, loss of condition may be the first thing noticed, but sometimes chronic scouring is very marked. When the superficial glands are attacked, they become considerably enlarged and hardened, and are rough to the touch. This roughness is due to the tubercles actually projecting from the surface of the gland; they are painless, and rarely burst and discharge. Snoring is sometimes very pronounced when certain of the deeper throat glands are affected.

The first indication of tuberculosis in a well-fed herd will probably be that one beast will begin to lose condition, and as time goes on the decline will become more marked. This is only a general guide, for occasionally when fat beasts are killed, it is found that they have been suffering from what is called generalized tuberculosis, and the whole carcass has to be condemned.

Diagnosis.

Although advanced cases may be readily discovered, the only certain means of detecting the disease in its early stages is by the tuberculin test, which is everywhere recognized as the most reliable and efficient test known for ascertaining the presence of tuberculosis in cattle. This test may be carried out by any qualified veterinary surgeon, and while by its use affected animals, even in the early stages, may be discovered, it does not upset or harm in any way the healthy beasts which are tested.

Spread of Tuberculosis.

The disease exists in every civilized country in the world, and the denser the population the greater the percentage of cases; and as with man so it is in the case of animals. Therefore the best means of staying its spread is to prevent overcrowding, and to ensure exposure to a plentiful supply of fresh air and sunshine. Tuberculosis is spread amongst cattle by rearing calves on milk from the tubercular cows, or by allowing sound and diseased animals to feed out of the same receptacles, or even by permitting a tubercular beast to stay in the herd.

Where the tubercle bacillus is present, tuberculosis will spread very rapidly amongst pigs when they are confined in damp, badly ventilated sties, or if they are fed on milk or offal from tubercular cows. It is always advisable that any meat fed to pigs should be cooked thoroughly. As tuberculosis is communicable from man to animals, a tubercular person should not be employed in tending cattle or pigs.

Prevention.

In an individual herd, prevention may be carried out when building up the herd by introducing only animals that have been submitted to and passed the tuberculin test. The herd should be tested annually, and if a beast reacts it should be at once removed, and all feeding utensils and the shed should be disinfected. If a tubercle-free herd is maintained under proper conditions, the disease should not make its appearance, and young stock from such a herd will command a very much higher price than those from a non-tested herd.

All cow-sheds should be well lighted and well ventilated, and have properly drained impervious floors. It is a precaution against tuberculosis to feed cows well, especially if they are high producers. A further precaution is to rug cows in cold weather. Calves that have always been well fed and have been reared in healthy surroundings will be much more unlikely to become tubercular than those that have been badly fed and confined in close, ill-ventilated buildings.

Guarding Against Infection.

As milk infected with the tubercle bacillus is one of the most prolific causes of tuberculosis in man, it would be well to treat all milk intended for food (except milk from certified tubercle-free cows) by heating it to 180° F., and keeping it at that temperature for fifteen minutes.

The milk of one cow should never be specially reserved for a child, except, of course, a cow that has passed the tuberculin test. A measure of milk taken from the mixed milk of a whole herd will not give the same risk of infection as milk from an individual cow.

A Notifiable Disease.

Both the Stock Diseases Act and the Dairy Supervision Act make it obligatory on owners to report immediately to the Department of Agriculture any outbreak of tuberculosis in their herds. By the terms of the Cattle Compensation and the Swine Compensation Acts, owners are also bound to report cases occurring in cattle or pigs, and where any animals are destroyed compensation will be paid.

POULTRY TICK.

By H. F. Clinton, Assistant Poultry Expert.

Poultry tick is a serious and troublesome pest in some of the warmer parts of the State. In colder districts it does not thrive so well. A knowledge of its life history and habits is essential for those poultry farmers whose birds have become infested, in order that steps may be taken to stamp it out. Such knowledge is equally necessary for those whose birds are free of the pest, in order that this immunity may continue.

Ticks and Their Eggs.

Ticks, in various stages of growth, together with their eggs, may be found concealed in the cracks and crevices of houses and perches. The eggs are of a brownish colour, and are about one-fortieth of an inch or slightly less in diameter. The newly-hatched ticks measure about one-thirty-second of an inch long; the older ones vary in length up to about one-third of an inch. They are oval in shape, flattened, with thin edges, and are covered on the upper surface with small pits of differing

Young Tick (shortly after hatching) with three pairs of legs.
Magnified approximately 16 times.

sizes. Their colour varies from brownish to grey black. They are without eyes. Breathing takes place through breathing apertures distributed throughout the body.

The eggs hatch out in from three to four weeks from the time they are laid. The newly hatched ticks crawl on to the birds, and remain attached to the skin for a few days. They may be seen in small clusters, seemingly blue-black in colour, with their mouth parts inserted into the skin on various parts of the body. The young ticks will usually remain on a bird's body for five days or so. During this time they will get enough nourishment to sustain them for a period, and they then seek hiding places in the perches and walls.

The adult ticks have four pairs of legs, but those newly hatched have only three pairs. A moult takes place in about a week after hatching, when the fourth pair of legs appears behind the third pair. From the time of hatching three moults take place, and they reach the adult stage in about 30 days. In the adult stage, the tick visits the birds at night, and in from 20 to 45 minutes it becomes fully engorged with blood, and returns to the cracks and crevices of the houses and perches.

It is well known that poultry tick will remain alive for two years or more without recourse to the fowl for food. Indeed, they have been

found alive in woodwork and fences after poultry have been away from the premises for several years. It will therefore be seen that complete eradication of the pest, once it has become established, is extremely difficult.

The effect on birds is very severe. The ticks not only cause them great discomfort at night, and consequent loss of sleep, but they may also introduce a harmful organism into the blood of the bird. This organism multiplies very rapidly, and produces a complaint known as tick fever, which often results in death. The general symptoms of this tick fever are a rise in temperature, restlessness, blackness and shrinkage of comb, prostration, and paralysis.

Methods of Stamping Out the Pest.

If those houses that are infested are not properly constructed, or are of little value, it is better to burn them, and rebuild on new ground. The ground where the old structure stood should be saturated with a strong disinfectant. It is recommended that houses in tick-infested areas be constructed of iron, with the woodwork on the outside, if possible. Angle or

Ticks at various stages of growth, and Eggs.
Magnified approximately three times.

tee-iron should, where practicable, be used in place of wood. For economic reasons all houses should be built so that, in case of an outbreak, they can be readily dismantled. They should also be built away from any other buildings or structures. Any wood used must be carefully selected, and should be as free from cracks as possible. In any circumstances, it should be coated with hot tar.

The perches, too, should be coated with tar, and they ought to be so made that they can be easily dismantled, for it is well to remove them every now and again, for there is always the possibility of ticks finding a hiding place between the perches and the walls of the house.

Perches can be suspended by wire from the roof, and metal cups, filled with a liquid disinfectant, may be soldered to each wire to prevent the tick from reaching the perches. These cups can also be fitted to most types of perches.

Pepper trees with their loose bark have been known to harbour large numbers of the pests. Ticks will travel along an infested fence to a

new poultry house, and they and their eggs may at times be conveyed from place to place by egg cases, crates, utensils, vehicles, wild birds, &c.

A thorough inspection of the poultry farm and plant should be frequently carried out. Regular spraying with a good disinfectant, such as sheep dip, will help to prevent the tick from getting a start. But once the pests have established themselves, it is almost hopeless to expect to reach every crevice where they and their eggs are concealed. If, during the spraying process, only a few specimens are missed, it will not be long before a heavy infestation occurs, for they multiply very rapidly.

A Dead Fowl on which the Young Tick may be seen in small clusters on various parts of the body.

The joints of the perches and crevices of the surrounding woodwork should be regularly treated with sheep dip used at full strength. The floors of the houses should be regularly and properly cleaned, and rubbish of all kind, both from inside and outside, must be burned.

If proper precautions are taken, it is quite possible to establish a poultry farm in a tick-infested area, which may be kept permanently free from the pest.

A Notifiable Disease.

The regulations under the Stock Diseases Act require that all outbreaks be immediately reported to the Chief Veterinary Inspector, Department of Agriculture.

FERTILIZERS FOR OATS.

WESTERN DISTRICT TESTS.

Exceptionally heavy yields of oats were obtained last season on the experimental field conducted by the Department of Agriculture, at Winchelsea, one plot yielding 98.9 bushels per acre. The plots, which are located on the farm of Mr. T. Caldow, were sown early in July with Algerian oats at the rate of 60 lb. per acre, and the crops were cut with the reaper and binder in December, and were threshed in February. The soil is a greyish-black basaltic loam, typical of the basaltic plains of the Western District. The tests were designed to determine the most suitable varieties, and the most profitable dressing of fertilizer for use in oat-growing in this portion of the State.

The results of the experiments indicate that the soils of the Winchelsea district give, perhaps, a more remarkable response to heavy applications of superphosphate than any other soils in the State. Last season an application of super., at the rate of 3 cwt. per acre, resulted in a yield of 98.9 bushels per acre, compared with 26.3 bushels per acre on the unmanured check plot. With 2 cwt. of super. per acre the yield last season was 65.8 bushels, and with 1 cwt. of super. per acre 60.9 bushels.

Details of the yields for last season, and the average yields for the two years in which the experiments have been in operation, are shown in the following table:—

	Yield, 1928. Bushels per acre.	Average Yield, 2 Years, 1927 and 1928. Bushels per acre.
Super., 3 cwt. per acre	98.9	84.3
Gypsum, 20 cwt., and Super., 2 cwt.	71.4	66.6
Lime, 20 cwt., and Super. 2 cwt....	71.0	69.6
Super., 2 cwt.	65.8	66.1
Super., 1 cwt.	60.9	58.4
Super., 2 cwt., and Ammon. Sulph., 44 lb.	51.7	57.7
Gypsum, 20 cwt.	27.0	29.8
No manure	26.3	32.3
Lime, 20 cwt.	25.6	28.7

Though these tests have been in operation for two years only, the results over that period are so similar and so closely in accord with those obtained in other portions of the Western District that they can be regarded as showing definitely that, by the more generous use of superphosphate, substantially increased yields could be obtained in this important oat-growing district.

The average dressing of superphosphate used with oats in the Western District is about 1 cwt. per acre, but these and other tests have demonstrated beyond doubt that a dressing of at least 2 cwt. per acre would be very much more profitable. If the value of oats be taken at 2s. 6d. a bushel, and the cost of the super. applied at 6s. per cwt., it will be found that, taking the average yields from the above plots for the past two years, the use of 1 cwt. of super. per acre has resulted in a net increased return of £2 19s. 3d. per acre. With the dressing of 2 cwt. the net increased return works out at £3 12s. 6d. per acre, and with 3 cwt. per acre at £5 12s.

The use of sulphate of ammonia in combination with superphosphate gave no increase in yield, nor have applications of lime or gypsum been followed by any profitable results.

The results of the variety trials were as follow:—

	Yield per acre, 1928. Bushels per acre.	Average Yield, 1927 and 1928. Bushels per acre.
Algerian ...	... 75.2	... 67
Mortgage Lifter ...	... 69.3	... 64
Lachlan ...	... 67.0	... 62.6
Palestine ...	... 63.0	... 59.4

The tests have not been in progress sufficiently long to determine definitely the most suitable oat variety for the district, but from the results available it would appear that Algerian is more than holding its own against the newer varieties, although where early grain crops are required Palestine and Lachlan would prove useful.

PASTURE IMPROVEMENT.

TESTS AT KORUMBURRA.

The pasture top-dressing plots conducted by the Department of Agriculture on the farm of Messrs. M. C. Lindsay and Sons, at Korumburra, were laid down on a pasture which had deteriorated as the result of long grazing. Native grasses and weeds had largely taken the place of the original plants sown, such as cocksfoot, ryegrass, and clovers, and the experiments were designed primarily to see whether the pasture could be brought back to its original productive state. The land on which the plots are located is typical of the better class hill country of Gippsland. The result of the work carried out has been a marked improvement in the top-dressed pasture, particularly where superphosphate has been applied.

The experimental field is divided into two sections, one being devoted to three bulk plots on which dressings of superphosphate at the rate of 1 cwt. and 2 cwt. per acre respectively are being compared with an unmanured check plot. The produce on these plots is cut and weighed as grass hay as an approximate measure of the carrying capacity. The second section comprises a number of smaller demonstration plots to which a range of fertilizers has been applied, including nitrogen, potash, and the soil amendment lime.

So far the outstanding fertilizer has been superphosphate, and attention therefore has been confined mainly to the bulk plots; but the fact that the soil is somewhat uneven does not make for reliability or accuracy of the results. At the same time it is obvious that substantial increases in yield are obtainable with dressings of super. up to 2 cwt. per acre. The results last year, and the average of the yields over the past three years, are as follow:—

Treatment.	Yield of Grass Hay. 1928. cwt.	Average Yield, 3 years. cwt.
No manure	14.1	13.2
Super. 1 cwt. per annum ...	17.0	14.7
Super. 2 cwt. per annum ...	21.4	18.8

Thus, over the three years' period, the application of super., at the rate of 2 cwt. per acre, has given an increase in yield of 42 per cent. over the unmanured plot. Even more important than this increase in yield is the improvement in the quality of the herbage. A botanical analysis of the produce cut from the plots shows that, where super. has been applied, there has been a substantial increase in the percentage of clovers and useful grasses, and a corresponding decrease in the proportion of weeds.

The results of these tests should not be regarded as indicating finally that superphosphate is the only fertilizer the use of which will prove profitable on this class of country. Some of the other dressings tried show promise. For instance, the two outstanding demonstration plots last year were those to which the following dressings had been applied:—(*a*) super. 1 cwt., and lime 20 cwt. per acre, and (*b*) basic slag 2 cwt. per acre. Both of these carried more ryegrass and a bigger percentage of clovers than the rest of the plots.

The extent to which the nitrogenous fertilizers applied have influenced the yields has not yet been determined. Last year, for the first time, the differences in growth on the demonstration plots were sufficiently marked to warrant their being harvested, but, unfortunately, this was not possible. However, arrangements are being made to have all plots cut and weighed in future.

The practice of top-dressing pastures is extending rapidly throughout the dairying country of Gippsland, and the future results of these and other pasture experiment fields will be awaited by dairy-farmers with considerable interest.

RESULTS ON LIGHT LAND.

The effect of superphosphate in increasing the carrying capacity of the light land in the Bannockburn district is illustrated by the results of the experiments which for the past five years have been carried out by the Department of Agriculture on the farm of Mr. H. A. Lumb. These results show that the application of superphosphate at the rate of 1 cwt. to the acre in 1923 and 1924 doubled the carrying capacity, and that this increase was practically maintained for a further period of four years without any subsequent application of manure.

The test was commenced in 1923, when an area of 10 acres of uniform virgin pasture on light sandy soil, freshly cleared of timber, was divided into two paddocks, each 5 acres in area. One paddock was top-dressed in both 1923 and 1924 with superphosphate at the rate of 1 cwt. per acre, while the other was unmanured. Ten sheep were placed on the top-dressed area, and five on the unmanured paddock. The sheep were weighed monthly in order to determine whether both enclosures were stocked to full capacity. In the first year of the test (1924) the weight of wool cut from the ten sheep on the top-dressed plot was 96 lb. as compared with 49 lb. from the five sheep on the unmanured plot. In 1925, no further manure was applied, but the test was continued in order to determine the residual effect of the original dressings of manure. The plot which was top-dressed in 1923 and 1924 carried ten ewes in lamb for eight months, whereas the unmanured plot carried five sheep for the same period. Sixty-five lb. of wool was cut from the sheep on the top-dressed plot, while those on the unmanured area produced 32½ lb. of wool.

The plots were then spelled for two months, but no manure applied, and in 1926 the test was resumed to determine whether the effect of the original dressing had been exhausted. The top-dressed plot carried nine wethers, which cut 94 lb. of wool, while the unmanured plot carried five wethers, which cut 59 lb. of wool.

In 1927, owing to the drought conditions prevailing at Bannockburn, and the consequent difficulty of providing water for the sheep, the test had to be discontinued, and both plots were grazed together by the bulk flock. In 1928, however, the test was resumed, and the plot which was top-dressed in 1923-24 still carried nine sheep, and the unmanured plot five.

The average annual rainfall at Bannockburn is just over 19 inches, but for three years of the test, 1925, 1926, and 1927, it was considerably below normal, the rainfall for these years being 13.19, 13.57, and 16.58 inches respectively.

In addition to the 5-acre plots, small demonstration plots, each one-sixth of an acre in area, were laid out in 1923. Different manures and combinations of manures were applied to these plots, and clovers sown across them in 1924. These plots were not harvested, but samples were cut from them, and a botanical analysis made of the produce. The results of this year's analysis show the marked effect of phosphatic manures in encouraging the growth of clovers and trefoils. On the unmanured plot the analysis showed no clovers, and a large proportion of weeds, but where phosphatic fertilizers had been applied, there was a comparatively high percentage of clovers with a corresponding decrease in the proportion of weeds.

DAIRY-HERD TESTING IN NEW ZEALAND.

The season of 1927-28 in New Zealand brought forth a revised interest in the testing of dairy herds for yield, with the result that almost 54,000 more cows were tested than in the preceding season. Moreover, the level reached this last season represents 27,280 cows more than for 1924-25, when the hitherto greatest number in the history of the movement in New Zealand since the inception of cow-testing in 1909 was recorded. Dairy-herd testing in New Zealand is carried out under several variants—three systems being now generally recognized, namely, "Association," "Group," and "Dairy Company." Under the association system the members themselves do the weighing and sampling of the output of their cows for two days (in a few cases one day) in every thirty days, while in the case of the group system weighing and sampling of the milk for each cow on test is done by a testing officer for one day every month. In both cases samples are tested by testing officers, and returns, figures, and sheets containing results returned to the dairy farmers. Testing under the dairy company system resembles the association method, except that the figuring of returns is left to the herd-owners themselves. Details of classification under these

three systems for the past five seasons are given in the following table. A fact immediately apparent from this table is the marked increase in the group system, an advance of 54,783 cows.

	1924-25.			1927-28.		
	Organization.	Cows.	Average Cows per Organization.	Organization.	Cows.	Average Cows per Organization.
Association ..	117	87,695	750	115	56,699	493
Group	91	100,055	1,100	127	164,610	1,296
Dairy Company..	51	9,100	178	18	2,821	157

As regards butter-fat production, last season's average yield figure shows a decrease of 15.80 pounds from that of 1926-27, the average production for 1927-28 being 224.68 pounds butter-fat, and for the previous season 240.48 pounds. The falling-off was due in part to the unfavorable season in 1927-28, and to the fact that 54,000 more cows were tested last year, involving the breaking of new ground by the extension of herd-testing to more outlying districts. This would mean the inclusion of many herds in the first stages of building up, and consequently of a number of lower-yielding individuals.

ORCHARD AND GARDEN NOTES.

The Orchard.

E. E. Pescott, F.L.S., Pomologist.

As soon as the fruit is off the trees, the land should be well ploughed and left in a rough condition until the spring ploughing. If not already done, and the orchard conditions demand it, there is still time to put in a leguminous crop for green manuring purposes. But this should be done as early as possible, so as to give the crop a chance to make some good early growth. Soils deficient in lime or in organic matter are always benefited by a crop of green manures. Where stable manure is unprocurable, the green manure crop is the only means of adding organic matter to the soil.

Pests and Diseases.

All second-hand and old cases should be thoroughly overhauled. It is preferable to do this work now, instead of leaving it till spring, when the rush of other duties will certainly prevent it being carried out. The cases, if not bad enough to be destroyed by fire, should be dipped for some time in boiling water. And this is not only for the killing of the codlin larvæ, but also to destroy larvæ or eggs of any scale or aphis, and also any spores of fungus diseases that may have found lodgment therein.

As soon as the trees have shed their foliage they may be sprayed with lime sulphur spray for woolly aphis, peach aphis, and the bryobia mite. And this should be done before pruning, so that in handling and carrying the prunings the pests will not be spread about the orchard to infect the clean portions.

In areas where Fruit Fly is suspected, a strict watch should be kept for perforated or infested fruit, all of which should be destroyed by boiling.

The Flower Garden.

Bulbs, tubers, and corms of spring-flowering plants should now all be planted. As they appear above ground, they should be protected from the ravages of snails and slugs, as these pests have a very great liking for these succulent growths. A good surface dressing of broken leaf or dust tobacco will effectually deal with these pests. In fact, the gardener who constantly uses tobacco, either in the leaf, stem, or dust forms, will very soon be in the happy position that slugs and snails will cause him no anxiety whatever. Besides, the tobacco has manurial properties which are also valuable. The remedy known as arsenate of calcium is an excellent killing poison for these pests.

Pansy and any other seedlings, also rooted layers and cuttings, may now be planted out into their permanent positions.

Sowings may also be made of any hardy annuals, such as antirrhinum, aquilegia, coreopsis, Canterbury bell, dianthus, everlastings, foxglove, gaillardia, hollyhock, larkspur, leptosyne, lobelia, marigold, pansy, petunia, stock, sweet peas, verbena, wallflower, and primula.

The Vegetable Garden.

There should now be no untidy or undug beds in the kitchen garden. The vacant beds should all be well dug over and prepared for the planting of vegetables for use in spring. In digging, a top dressing of manure should be given; this may be dug in. All weeds, too, may be forked into the trenches, and covered well with soil as each spit or length is dug. A dressing of lime is very beneficial at this time of the year three or four weeks after the manure or weed dressing.

A start should now be made at cleaning out the asparagus beds. This vegetable is most popular, and yet one rarely met with in ordinary household gardens. It is supposed to be difficult to grow, but this supposition is not borne out, as, once established, a bed of asparagus is one of the most easily managed plots in the whole garden. Depth of good soil and plenty of manure are all that this plant requires.

In establishing a new bed, it is advisable to see that there is a good depth of 2 or 3 feet of rich, well-manured soil. If this is not present, the soil should be dug out to that depth, and thoroughly mixed and enriched with well-rotted manure before being replaced. A bed deeply prepared, and supplied with ample quantities of manure should last without replanting for very many years. The young plants or crowns should then be planted in trenches, keeping the rows 2 or 3 feet apart. An asparagus bed requires ample and direct exposure to the full rays of the sun. The asparagus should not be cut during the first season after planting; in fact, it is better to allow it to go uncut for two

seasons. As little foreign weed growth as possible should be allowed in the beds, but, when they are not producing culinary asparagus, rows of lettuce, beans, radish, &c., may be grown between the crowns.

Towards the end of April the tops may be cut down, the beds cleaned, and a good top-dressing of stable manure given. Chemical fertilizers, such as bonedust, sulphate of ammonia, and sulphate of potash, may be given as a substitute to organic manure. In the past it has been the custom to annually top-dress the beds with salt. It was supposed that, as asparagus in its native habitat was usually found in sandy soils near the sea coast, the plant required salt or a saline soil to produce successful results. It has been found, however, that salt is not at all essential to good growth, and that the plant will readily adapt itelf and grow well in soils of not at all a saline character. Where potash has taken the place of salt, quite improved results followed.

Seeds of onion, turnip, cabbage, cauliflower, carrot, and parsnip may now be sown.

REMINDERS FOR MAY.

LIVE STOCK.

HORSES.—Those stabled can be fed liberally. Those doing fast or heavy work should be clipped; if not wholly, then trace high. Those not rugged on coming into the stable at night should be wiped down and in half-an-hour's time rugged or covered with bags until the coat is dry. Old horses and weaned foals should be given crushed oats. Grass-fed working horses should be given hay or straw, if there is no old grass, to counteract the purging effects of the young growth. Attend to teeth and feet of horses to be turned out for the winter.

CATTLE.—Cows may be rugged to advantage at night and on cold days. Give a ration of hay or straw, whole or chaffed, to counteract the purging effects of young grass. Don't deny the extra food necessary to satisfy the winter appetite. Cows close up to calving, especially if in good condition, should have their diet reduced to much below what rich young grass supplies. Newly-born calves will now be better for a dry, warm shed. See that calves over a week old have freedom to romp, and a dry and sheltered camping place.

PIGS.—Sows not already served should be put to the boar. Supply all pigs with plenty of bedding, and see that sties are warm and well ventilated. Supply sows in pig with a balanced ration. Castrate young boars as early as possible. Pigs should be highly profitable now, as pork is a good price. Rape, barley (especially skinless), oats, &c., may be sown for grazing during winter. Pigs should be supplied with plenty of charcoal and bone meal.

SHEEP.—Lambing is in full swing during the month of May—particularly in the warmer districts. Ewes should be kept in strong condition—neither too fat nor excessively fat. When the lambs are dropping, the most liberal treatment possible so far as concerns feed, shelter, and general attention pays; this care should be continued until the lambs are weaned.

Self-preservation being such a very strong factor in nature, it follows that badly-fed ewes will make bad mothers. Very old or very young ewes, if underfed, are usually very neglectful of their new-born lambs.

Late April and early May lambs may be marked towards the end of May. This work should be done in fine weather, and, if possible, most of the marking should be completed by, say, 3 p.m., so as to allow the lambs to mother before

the evening sets in. It is advisable to yard lambs with their mother the night before marking, so that the work will not be undertaken when the lambs are overheated. The work should not be done in dirty yards, and the use of temporary enclosures is recommended. Plan of same may be obtained from the Department on application. A rest after the operation is also advisable to permit of a lessening of the blood-flow from the wounds before travelling. Every precaution must be taken to prevent deaths from tetanus or lock-jaw, or from blood poisoning, which troubles frequently occur as a result of docking lambs in filthy yards, and from using filthy instruments. Before commencing, all knives, pliers, &c., should be thoroughly cleansed and disinfected in a solution of one part carbolic acid to twenty parts of water; they should also be frequently disinfected while in use.

Most flock-owners are agreed that the purse of male lambs should be drawn tight by the fingers, and the end completely severed. Slitting the purse is far too tedious, and is not recommended in any circumstances. In tailing, never draw tails tight, as the projecting bone will delay healing; particularly so if hot blades are used. Even when the cutting is done with a knive, enough loose skin should be left to cover the bone and veins so as to check the strong flow of blood which usually occurs in lambs of well-fed mothers. Losses should be avoided in every possible way.

If not already done, sheep should now be crutched, as the young grass of May tends to cause scour. Wool-blindness in fine-woolled sheep may now need attention. In wet districts, dry paddocks should be used to the full extent. A sharp look-out must be kept for such pests as foxes, rabbits, eagles, dogs, &c.

Poultry.—Feed animal food to forward pullets, about ½ oz. daily, and equal parts heavy oats and broken maize at night. Succulent greenstuff should be fed daily. See that fowl houses are free from draughts to avoid colds, also that they are free from red mites. Use Epsom salts and sulphur once a week to avoid Roup and Chicken Pox.

CULTIVATION.

Farm.—Dig main crop potatoes. Push on with ploughing and sowing of cereal crops, and peas and beans. Green fodder (as for April) may still be sown. Land for maize, potatoes, and other root crops should be prepared and manured. Flax may be sown. Transplant Chou Moellier and Giant Drumhead cabbage plants in rows 3 feet apart. Complete sowing permanent pastures with grasses and clovers.

Orchard.—Plough, manure; apply lime to orchard lands at rate of 5 or 10 cwt. per acre where soil is sour. Spray trees infested with scale insects, Woolly Aphis, and Bryobia Mite with red oil or crude petroleum. Clean all rough bark from trees. Commence pruning early varieties at end of month. Pick up and boil all fallen fruit.

Flower Garden.—Digging, manuring, and pruning; trench and drain where necessary. Dress the surface with lime. Continue to sow hardy annuals. Bury all leaves, soft-wood cuttings, and weeds. Continue to plant spring blooming perennials and other plants. Plant cuttings of carnations and roses.

Vegetable Garden.—Cut down and clean out asparagus beds. Apply manure and lime dressings. Cultivate deeply. Plant out seedlings and early potatoes; sow peas, broad beans, carrots, and parsnips.

Vineyard.—Subsoil land for new plantations if not already done. This work should be carried out as long before planting as practicable. Vine-growers are warned against the too common practice of feeding off foliage after vintage. Any small advantage in the form of stock feed is only gained at the cost of a reduction in the following season's crop, owing to interference with accumulation of reserves which continues so long as the leaves remain green. Sheep or other animals should not be allowed into the vineyard until the leaves have changed colour. Early and deep ploughing is strongy recommended. Manures should be applied as early as possible. Peas, &c., for green manuring, should be sown without delay, in order to take advantage of early rains.

Cellars.—Rack or fill up (preferably the former) dry wines as soon as a lighted match, introduced at bung hole, is no longer extinguished. Sweet wines should also be racked and fortified to full strength.

BEE-KEEPING.

May is the last month during which bees may be examined, handled, and, if necessary, fed without risk of endangering the existence of the colonies or seriously interfering with their safe wintering. Supers (upper stories) should be removed and stored indoors in a dry place, care being taken that bee moths cannot get access to the combs. Where suitable storage room is not available indoors, the boxes of spare combs may be left outside, but should be placed underneath the box containing the cluster of bees and the entrance to the hive contracted to one third or fourth of the summer width.

Small colonies should be reduced to one set of combs in a single story, and any combs not covered by bees are best removed if the amount of stores is insufficient and has to be supplemented by feeding sugar syrup. The amount of honey or sugar syrup necessary to carry bees safely through the winter varies according to the strength of the colony, the locality, and the earlier or later flowering of the spring flora of the district. It is therefore not possible to state what the amount should be; it may, however, be laid down as a general rule that the combs which the bees cover at this time of the year should be at least more than half-full of sealed honey or sugar syrup. When sugar syrup has to be fed to supplement the stores it should be of the density of ripe honey, or approximately two (by weight) to one of water. The simplest way of making syrup is to pour the measured quantity of dry sugar into the correct amount of boiling water, keeping it on the stove and stirring it till dissolved. The syrup should be given blood warm in a simplicity or frame feeder inside the hive.

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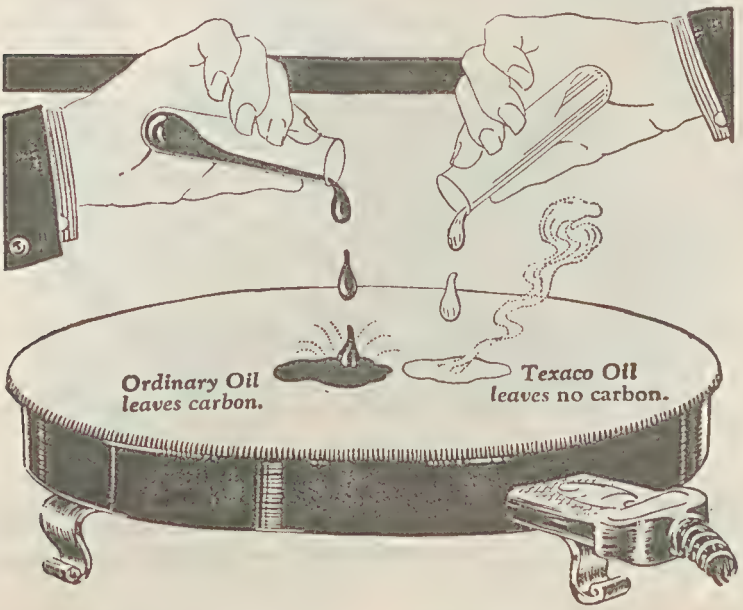

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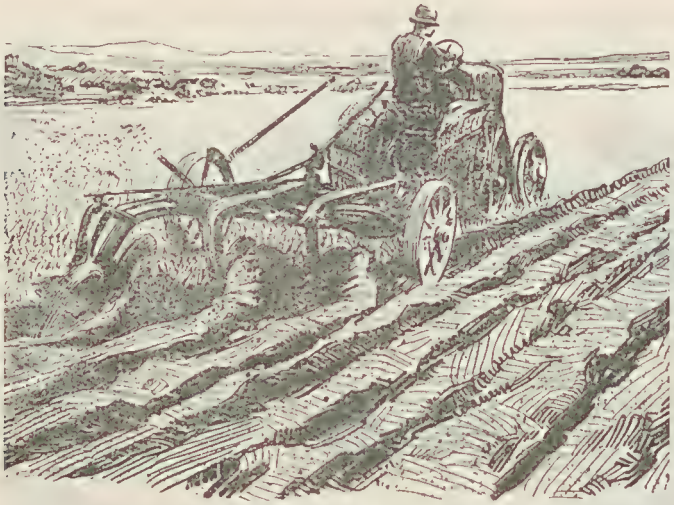

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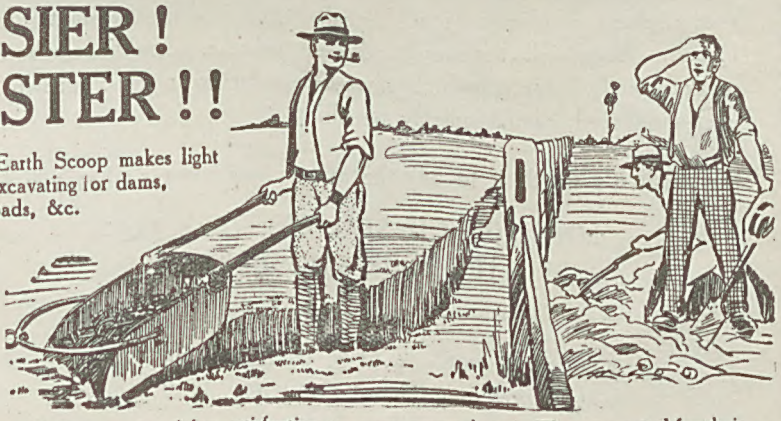

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